Water Distribution From Automatic Sprinklers

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A STUDY

of

WATER DISTRIBUTION FROM AUTOMATIC SPRINKLERS

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A THESIS

Presented by

J. L. Schmidt

C. R. Alling

to the

President and Faculty

of

ARMOUR INSTITUTE OF TECHNOLOGY

for the degree of

BACHELOR OF SCIENCE IN FIRE PROTECTION ENGINEERING

having completed

the prescribed course of study in

FIRE PROTECTION ENGINEERING.

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SPRINKLER DISTRIBUTION TESTS.

The object of this test was to determine accurately the distribution of water from automatic sprinklers over a definite floor area. While sprinkler heads have received considerable attention in the past as regards distribution in a general way, accurate data has never been obtained from which to draw conclusions as to their relative merits in coping with fire. It was thought best to confine these tests to a study of the action of two approved heads of widely differing types, at different distances below both plane and joisted ceilings, in upright and pendant positions, and at various pressures. For this purpose the Manufacturers and Grinnell heads were used, the former having a rotary, and the latter a fixed deflector. The tests were made indoors, and in still air.

The Rules and Requirements of the National Board of Fire Underwriters specify that a sprinkler should be effective over an area of approximately one-hundred (100) square feet. In these tests a floor area of approximately one-hundred and forty-four (144) square feet was covered by galvanized iron pans, each 12" x 12" x 12", designed so that two edges lapped over the edges of the adjoining pans, thus preventing the leakage of water between them. The joisted ceiling was 9' 4-3/4" from the upper edges of the pans, and was made up of fourteen (14) joists, 16" deep, 2-1/2" thick, and 12" on

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centers. The plane ceiling was 9' 3" from the top edges of the pans, and was made up of four (4) squares of 7/8" flooring boards, each 4' x 4', suspended from the joisted ceiling.

The head was, in all cases, placed directly over the center of the pans. For the upright position, a vertical brass pipe, which could be raised or lowered to any desired level, was connected with a horizontal pipe 13-5/8" long, terminating in a reducing elbow, into which the head was screwed. The horizontal pipe was provided with a piezometer connection, placed close to the reducing elbow. This piezometer was connected by a rubber hose to a 10" Marsh gage on the front of the distribution rack. All pressures used in the distribution tests were read on this gage. The pendant connection consisted of a vertical brass pipe placed centrally over the pans.

For the upright position, the sprinkler heads were placed with their deflectors 4", 8" and 12" below the ceiling. In each of the positions, pressures of 10#, 45# and 65# were maintained throughout the run. In the pendant position only three tests were made, and these with the Grinnell head, flush with the plane ceiling. The pressures were obtained from a 50 gallon Quimby screw pump, augmented for the higher values by a 4500 gallon pressure tank.

The piezometer, in the upright connection, was placed back of the reducing elbow, while in the pendant connection, it was placed directly back of the head. This arrangement and

and the possible difference in the two piezometers would, it was thought, give different results under the same conditions, and was borne out by the experimental determinations. A series of calibration tests was made to find the total discharge of each head in both upright and pendant positions, in order to determine the amount of water thrown outside the twelve (12) foot square. The same pipe connections were used in both the calibration and the distribution tests. The sprinkler connections were attached to a length of pipe leading from the pump and pressure tank. The hose from the piezometer led to a 60" mercury gage, which was used for the lower pressures. This was a U gage, having one side vented to the atmosphere and the other connected to the piezometer. In order to obtain accurate results with a gage of this type, it is necessary that the pressure side be filled solidly with water, and that a small amount of water be left on the vented side for the purpose of lubrication. (C in Calibration Data). The mercury gage was below the piezometer connection, and consequently it was necessary to subtract from the apparent reading (A and B in Calibration Data) the pressure due to the weight of the column of water on the pressure side. This reading, when corrected for velocity pressure (= .0011148 $\frac{G^2}{d^4}$, where d = diameter of pipe in inches, and G = gallons per minute flowing), gave the true pressure. Connections were also provided, by means of which a 100# Crosby gage (#54) could be employed for the higher pressures. The sprinkler was covered by a metal hood and the discharge collected in a

260 gallon measuring tank. Sufficient data were obtained to plat curves showing the relation between the discharge in gallons per minute and the true pressure. The duration of the run was regulated by the discharge, time being taken by a stop watch, and a sufficient number of runs made to obtain a fair average in each case.

The distribution tests were carried on in the following manner:-

The pans were set in position, and an iron frame, carried on wheels and covered by a tarpaulin, was run over them. This frame was large enough to completely cover the pans. The head was lowered to the desired level, and the pressure carefully adjusted to the proper value. The frame was then withdrawn, allowing the pans to catch the water from the sprinkler head. To secure accurate results, the run was made as long as possible. When the pans were nearly filled, they were covered by a second frame, similar to the first, run in from the opposite edge. To obviate the error due to the spray from the head before the pressure had been adjusted to the proper value, and to the drips from the joists or ceiling after the run, it was necessary to devise some plan whereby the pans could be readily covered and uncovered. This was accomplished by the two frames mentioned above. The interval of time elapsing between the uncovering of one edge of the twelve foot square of pans by one frame, and the covering of the same edge by the second frame, constituted a run, time being taken by a stop watch. In these tests, time was taken from the uncovering

of one edge of the pans by one frame and the covering of the opposite edge by the second frame. This introduced an error in the results, which, however, was so slight as to make no appreciable difference in the data. After several trials it was found that the frames could be moved backward and forward at practically a constant rate by hand, and it was therefore deemed unnecessary to devise a mechanical contrivance to move them. The water collected by each pan was measured in a tank, calibrated to twentieths of a gallon. Pans containing less then two-tenths of one gallon for the entire run, were considered as "Traces".

CONCLUSIONS.

The Grinnell head, when placed four inches from the joisted ceiling and in an upright position, was effective only in the channel above the sprinkler for the lowest pressure, while for the higher pressures it took care of the middle three channels. The distribution on the floor was better for the lower pressure than for the two higher values, as the water was not broken up in fine drops. The plane ceiling under the same conditions was wet in a three and a half foot (3-1/2') circle for the lowest pressure, while for the higher values a five foot (5') circle was well protected. The distribution over the floor with the lower pressure was fair over a six foot (6') circle, but again, with the higher pressures, the effectiveness was decreased because of the fineness of the drops.

The Grinnell head, when placed eight (8) inches from the joisted ceiling in an upright position, gave good results in the middle three channels for all pressures, and fair for the higher values in the outer channels of the middle five. The floor distribution was practically the same as when the head was placed four (4) inches from the ceiling. The plane ceiling under the same conditions, for a pressure of ten (10) pounds, was wet in a five foot (5') circle, while for forty (40) pounds pressure, the edges of the ceiling dripped, giving questionable results. Again, with the higher pressure, the drops were too fine.

The Grinnell head, when placed twelve (12) inches from the joisted ceiling in an upright position, took care of the middle three channels. For the higher pressures, the breaking up of the drops in the form of mist was again noticeable. For the plane ceiling at the same distance, only one run was possible, and that at ten (10) pounds, because of the error due to the drips from the edges. The ceiling was well wet in a seven foot (7') circle, with a fair floor distribution.

Three runs were made with the Grinnell head in a pendant position, flush with the ceiling (deflector two inches from same). This method of installing sprinklers is becoming common, more especially in department stores, because of its less objectionable appearance. For the lower pressure, the floor distribution was fair over an eight foot (8') circle, but even for this pressure a large

amount of water was thrown outside the area covered by the pans. For the higher pressures the distribution was over so large a circle and broken up in such fine drops as to seriously impair its efficacy.

The Manufacturers head, when placed four (4) inches from the joisted ceiling in an upright position, protected the middle three channels and gave very good distribution on the floor for all pressures. The plane ceiling was wet in a circle varying from 2-1/2 feet (2-1/2') for the lowest pressure, to six feet (6') for highest, while the floor distribution was good in all cases.

The Manufacturers head, when placed eight (8) inches from the joisted ceiling in an upright position, gave good results in the middle three channels and fair in the outer two of the five, again giving very good floor distribution for all pressures. With the plane ceiling, under the same conditions, the Manufacturers head thoroughly protected the ceiling in a three foot (3') circle for ten (10) pounds pressure, and a five foot (5') circle for forty-five (45) pounds. The floor was well taken care of in a six foot (6') circle for forty-five (45) pounds.

The same head, when placed twelve inches from the joisted ceiling in an upright position, at ten (10) pounds pressure, was effective in three channels, at forty-five (45) pounds was fairly effective in five channels, while at sixty-five pounds (65#), it was fairly effective in seven channels. One run was made with the plane ceiling, giving

a good floor distribution over a five foot (5') circle.

In general, the results seem to indicate that the Manufacturers head gives a heavier distribution where most needed, than does the Grinnell. The difference in the types of deflectors is probably very largely responsible for this. It was plainly noticeable, in the case of the Grinnell, that the discharge was broken up in the form of spray for the higher pressures. This was not true with the Manufacturers. Furthermore, with the Grinnell head there were portions of the floor which were not well protected, owing to the fact that the form of the deflector did not permit of the proper distribution. It would also seem from the results that a pendant head flush with the ceiling is an undesirable arrangement, the distribution being over entirely too great an area for one head alone to do effective work.

Better floor distribution was obtained with the heads four (4) inches from the ceiling than at greater distances. The ceiling, however, was not so well taken care of at this distance. The best results for both ceiling and floor protection were obtained when the head was placed eight (8) inches from the ceiling. The percentage of water distributed over the ten foot (10') square was, in almost every case, greater for the Manufacturers than for the Grinnell under the same conditions.

	Pressure.	Percentage of Water Within 10 foot square. Grinnell.	Manufacturers.
Upright. 4" from plane ceiling.	10#	67.4	55.4
	45#	49.6	67.5
	65#	51.9	63.5
Upright. 4" from joisted ceiling.	10#	59.1	68.5
	45#	72.3	70.5
	65#	62.9	67.6
Upright. 8" from plane ceiling.	10#	60.6	69.7
	45#	57.6	71.1
Upright. 8" from joisted ceiling.	10#	61.9	66.3
	45#	55.4	76.1
	65#	65.2	75.4
Upright. 12" from plane ceiling.	10#	60.0	56.3
Upright. 12" from joisted ceiling.	10#	61.7	77.7
	45#	64.4	67.5
	65#	62.7	72.1
Pendant. Flush with plane ceiling.	10#	33.9	———
	45#	25.6	———
	65#	22.6	———

SPRINKLER DISTRIBUTION TESTS

DATE April 16, 1907.

CONSTRUCTION OF CEILING Joisted

MAKE OF SPRINKLER Manufacturers

POSITION OF SPRINKLER Upright

DISTANCE OF HEAD FROM CEILING 4"

.01	.01	.02	.02	.03	.03	.03	.02	.02	.01	.01	.01
.01	.02	.03	.03	.04	.04	.04	.04	.02	.02	.01	.01
.02	.03	.04	.05	.06	.07	.07	.04	.03	.02	.02	.01
.04	.06	.08	.08	.09	.12	.11	.08	.04	.03	.02	.02
.06	.12	.13	.13	.28	.18	.19	.34	.11	.04	.03	.03
.08	.16	.21	.30	.99	.10	.12	.85	.25	.11	.07	.07
.08	.14	.23	.46	.96	.15	.57	.69	.27	.15	.11	.06
.05	.06	.07	.16	.32	.18	.27	.26	.05	.05	.07	.05
.03	.04	.05	.07	.10	.13	.12	.13	.04	.01	.03	.03
.03	.03	.04	.04	.06	.12	.06	.05	.05	.03	.01	.02
.02	.02	.03	.04	.04	.05	.04	.03	.04	.03	.02	.01
.02	.02	.03	.03	.03	.03	.03	.03	.02	.02	.02	.01

DIAM. OF RUN 4'16 4/5"

W. P. AT SPRINKLER 8.1#

W. P. AT PUMP 10#

DISCHARGE GAL./MIN. 18.8

TRACES = 0

SPRINKLER DISTRIBUTION TESTS

DATE April 17, 1907

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 Trace	2 Trace	3 Trace	4 Trace	5 Trace	6 Trace	7 Trace	8 Trace	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 Trace	15 Trace	16 .12	17 .14	18 .11	19 Trace	20 Trace	21 Trace	22 Trace	23 Trace	24 Trace
25 Trace	26 .10	27 .15	28 .22	29 .24	30 .20	31 .13	32 Trace	33 Trace	34 Trace	35 Trace	36 Trace
37 .10	38 .17	39 .24	40 .27	41 .34	42 .29	43 .25	44 .16	45 Trace	46 Trace	47 Trace	48 Trace
49 .14	50 .19	51 .60	52 .33	53 .39	54 .20	55 .34	56 .43	57 .23	58 Trace	59 Trace	60 Trace
61 .23	62 .40	63 .88	64 1.02	65 1.03	66 .25	67 .22	68 .96	69 1.18	70 .32	71 .18	72 Trace
73 .16	74 .57	75 .77	76 1.82	77 .63	78 .30	79 .47	80 1.54	81 1.04	82 .65	83 .28	84 .13
85 Trace	86 .10	87 .20	88 .60	89 .31	90 .17	91 .12	92 .48	93 .13	94 Trace	95 Trace	96 Trace
97 Trace	98 Trace	99 .14	100 .15	101 .33	102 .23	103 .16	104 .33	105 .10	106 Trace	107 Trace	108 Trace
109 Trace	110 Trace	111 .09	112 .13	113 .17	114 .23	115 .14	116 .16	117 .12	118 Trace	119 Trace	120 Trace
121 Trace	122 Trace	123 Trace	124 .10	125 .12	126 .15	127 .12	128 .14	129 .11	130 Trace	131 Trace	132 Trace
133 Trace	134 Trace	135 Trace	136 Trace	137 .07	138 .09	139 .11	140 .12	141 Trace	142 Trace	143 Trace	144 Trace

TIME OF RUN 2'31"

GAGE PRESSURE 43.8 #

TRUE PRESSURE 45 #

DISCHARGE GAL./MIN. 36.8

TRACES = ?

Each trace taken as .02 gal/min. in figuring gals/min. in 100 ft² area.

SPRINKLER DISTRIBUTION TESTS

DATE April 17, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 Trace	2 Trace	3 .07	4 .10	5 .09	6 .06	7 Trace	8 Trace	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 .07	15 .14	16 .21	17 .19	18 .13	19 .07	20 Trace	21 Trace	22 Trace	23 Trace	24 Trace
25 Trace	26 .11	27 .21	28 .29	29 .30	30 .25	31 .14	32 .07	33 Trace	34 Trace	35 Trace	36 Trace
37 .11	38 .18	39 .31	40 .43	41 .37	42 .30	43 .28	44 .21	45 .10	46 Trace	47 Trace	48 Trace
49 .12	50 .23	51 .33	52 .53	53 .33	54 .19	55 .37	56 .56	57 .26	58 .11	59 Trace	60 Trace
61 .23	62 .42	63 .59	64 .97	65 1.24	66 .28	67 .23	68 .89	69 1.35	70 .29	71 .19	72 .09
73 .34	74 .92	75 1.42	76 1.64	77 .60	78 .40	79 .50	80 1.48	81 .96	82 1.40	83 .53	84 .19
85 .09	86 .15	87 .25	88 1.06	89 .56	90 .29	91 .18	92 .72	93 .12	94 .26	95 .10	96 Trace
97 Trace	98 .12	99 .19	100 .55	101 .25	102 .29	103 .15	104 .36	105 .36	106 Trace	107 Trace	108 Trace
109 Trace	110 .08	111 .13	112 .17	113 .27	114 .27	115 .17	116 .17	117 .15	118 Trace	119 Trace	120 Trace
121 Trace	122 Trace	123 .11	124 .15	125 .17	126 .21	127 .14	128 .15	129 .14	130 Trace	131 Trace	132 Trace
133 Trace	134 Trace	135 .07	136 .12	137 .14	138 .12	139 .12	140 .15	141 .12	142 Trace	143 Trace	144 Trace

TIME OF RUN 2'45"

GAGE PRESSURE 64.1 #

TRUE PRESSURE 65 #

DISCHARGE GAL./MIN. 448

TRACES = 1.46 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 17, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 Trace	3 Trace	4 Trace	5 Trace	6 .03	7 .03	8 Trace	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 Trace	15 .03	16 .04	17 .05	18 .05	19 .04	20 .04	21 Trace	22 Trace	23 Trace	24 Trace
25 Trace	26 .03	27 .05	28 .05	29 .07	30 .09	31 .07	32 .05	33 Trace	34 Trace	35 Trace	36 Trace
37 .04	38 .07	39 .09	40 .10	41 .13	42 .16	43 .14	44 .09	45 .05	46 .04	47 Trace	48 Trace
49 .07	50 .13	51 .14	52 .17	53 .35	54 .25	55 .26	56 .33	57 .11	58 .05	59 .04	60 Trace
61 .08	62 .16	63 .19	64 .27	65 .68	66 .08	67 .15	68 .64	69 .20	70 .10	71 .07	72 .04
73 .07	74 .14	75 .18	76 .33	77 .58	78 .19	79 .55	80 .45	81 .17	82 .12	83 .09	84 .06
85 .05	86 .07	87 .09	88 .22	89 .40	90 .20	91 .30	92 .20	93 .05	94 .06	95 .07	96 .05
97 .03	98 .04	99 .06	100 .10	101 .16	102 .18	103 .17	104 .10	105 .04	106 Trace	107 .03	108 .03
109 Trace	110 .03	111 .03	112 .07	113 .09	114 .15	115 .09	116 .06	117 .05	118 .03	119 Trace	120 Trace
121 Trace	122 .03	123 .03	124 .05	125 .05	126 .06	127 .05	128 .05	129 .04	130 .03	131 Trace	132 Trace
133 Trace	134 Trace	135 .02	136 .05	137 .04	138 .04	139 .04	140 .04	141 .03	142 .03	143 Trace	144 Trace

TIME OF RUN 8'0"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GALLONS 18.8

TRACES = .69 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 24 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 Trace	3 Trace	4 .06	5 .07	6 Trace	7 Trace	8 Trace	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 Trace	15 .08	16 .13	17 .16	18 .13	19 .09	20 .06	21 Trace	22 Trace	23 Trace	24 Trace
25 .05	26 .11	27 .13	28 .22	29 .27	30 .13	31 .30	32 .13	33 .08	34 Trace	35 Trace	36 Trace
37 .10	38 .15	39 .24	40 .35	41 .46	42 .34	43 .33	44 .30	45 .18	46 Trace	47 Trace	48 Trace
49 .14	50 .22	51 .31	52 .51	53 .52	54 .18	55 .27	56 .49	57 .44	58 .37	59 Trace	60 Trace
61 .22	62 .37	63 .57	64 .76	65 .88	66 .23	67 .23	68 .59	69 1.20	70 .51	71 .13	72 .09
73 .19	74 .35	75 .67	76 1.28	77 .41	78 .41	79 .55	80 1.12	81 .72	82 .40	83 .24	84 .11
85 .18	86 .14	87 .28	88 .92	89 .42	90 .18	91 .16	92 .63	93 .17	94 .08	95 .08	96 .06
97 .06	98 .11	99 .25	100 .53	101 .40	102 .29	103 .22	104 .45	105 .16	106 Trace	107 Trace	108 Trace
109 Trace	110 .08	111 .14	112 .18	113 .20	114 .30	115 .23	116 .23	117 .14	118 .05	119 Trace	120 Trace
121 Trace	122 .06	123 .08	124 .11	125 .13	126 .14	127 .15	128 .16	129 .10	130 .06	131 Trace	132 Trace
133 Trace	134 Trace	135 Trace	136 .06	137 .07	138 .09	139 .12	140 .13	141 .05	142 Trace	143 Trace	144 Trace

TIME OF RUN 3'57 2/5"

GAGE PRESSURE 43.8#

TRUE PRESSURE 45#

DISCHARGE GAL/MIN. 36.8

TRACES = 1.28 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 23, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 Trace	3 Trace	4 .09	5 .09	6 Trace	7 Trace	8 Trace	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 Trace	15 .12	16 .20	17 .20	18 .14	19 Trace	20 Trace	21 Trace	22 Trace	23 Trace	24 Trace
25 Trace	26 .12	27 .21	28 .32	29 .35	30 .27	31 .18	32 .11	33 .09	34 Trace	35 Trace	36 Trace
37 .11	38 .19	39 .32	40 .58	41 .65	42 .38	43 .37	44 .32	45 .23	46 .09	47 Trace	48 Trace
49 .15	50 .23	51 .35	52 .94	53 .23	54 .19	55 .25	56 .43	57 .66	58 .14	59 Trace	60 Trace
61 .24	62 .39	63 .51	64 1.18	65 .69	66 .25	67 .22	68 .69	69 1.27	70 .25	71 .14	72 .08
73 .26	74 .54	75 1.02	76 1.14	77 .59	78 .48	79 .55	80 1.34	81 .77	82 .66	83 .35	84 .17
85 .11	86 .21	87 .32	88 .92	89 .64	90 .29	91 .36	92 .80	93 .43	94 .12	95 .11	96 .08
97 .09	98 .21	99 .75	100 .70	101 .41	102 .22	103 .15	104 .26	105 .50	106 Trace	107 Trace	108 Trace
109 .08	110 .15	111 .22	112 .30	113 .33	114 .37	115 .25	116 .16	117 .13	118 Trace	119 Trace	120 Trace
121 .06	122 .10	123 .15	124 .17	125 .17	126 .18	127 .20	128 .06	129 .24	130 .29	131 Trace	132 Trace
133 Trace	134 .05	135 .09	136 .12	137 .12	138 .12	139 .16	140 .15	141 .08	142 .04	143 Trace	144 Trace

TIME OF RUN 4'3"

GAGE PRESSURE 64.1 #

TRUE PRESSURE 65 #

DISCHARGE GALLONS 44.8

TRACES = 1.22 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 24, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 12"

1 Trace	2 Trace	3 .02	4 .03	5 .04	6 .04	7 .04	8 .03	9 .03	10 Trace	11 Trace	12 Trace
13 Trace	14 .03	15 .03	16 .04	17 .05	18 .06	19 .05	20 .04	21 .03	22 Trace	23 Trace	24 Trace
25 .03	26 .04	27 .06	28 .08	29 .10	30 .11	31 .10	32 .07	33 .05	34 .04	35 .03	36 Trace
37 .05	38 .08	39 .11	40 .14	41 .19	42 .21	43 .20	44 .16	45 .11	46 .06	47 .03	48 .03
49 .08	50 .11	51 .15	52 .28	53 .37	54 .23	55 .23	56 .40	57 .28	58 .10	59 .05	60 .04
61 .15	62 .13	63 .18	64 .36	65 .42	66 .08	67 .12	68 .46	69 .37	70 .13	71 .09	72 .06
73 .08	74 .13	75 .21	76 .58	77 .17	78 .13	79 .40	80 .50	81 .23	82 .13	83 .12	84 .02
85 .05	86 .08	87 .18	88 .44	89 .25	90 .15	91 .26	92 .41	93 .12	94 .08	95 .08	96 .07
97 .04	98 .06	99 .12	100 .21	101 .29	102 .28	103 .30	104 .24	105 .09	106 .03	107 .04	108 .05
109 .04	110 .05	111 .07	112 .10	113 .13	114 .20	115 .12	116 .09	117 .05	118 .03	119 Trace	120 Trace
121 .03	122 .03	123 .05	124 .06	125 .06	126 .06	127 .06	128 .05	129 .04	130 .03	131 Trace	132 Trace
133 .03	134 .03	135 .04	136 .04	137 .04	138 .04	139 .04	140 .04	141 .03	142 .03	143 Trace	144 Trace

TIME OF RUN 8' 59 3/5"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GAL/MIN 18.8

TRACES = .33 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 24, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF SPRINKLER Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 12"

1 Trace	2 Trace	3 Trace	4 .06	5 .06	6 ?	7 .04	8 Trace	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 Trace	15 .08	16 .12	17 .14	18 .11	19 .08	20 .06	21 Trace	22 Trace	23 Trace	24 Trace
25 .06	26 .10	27 .16	28 .24	29 .29	30 .24	31 .15	32 .11	33 .08	34 Trace	35 Trace	36 Trace
37 .10	38 .16	39 .27	40 .43	41 .53	42 .43	43 .33	44 .32	45 .19	46 .08	47 Trace	48 Trace
49 .14	50 .22	51 .23	52 .74	53 .33	54 .27	55 .30	56 .56	57 .54	58 .11	59 .06	60 Trace
61 .19	62 .33	63 .42	64 .96	65 .38	66 .24	67 .25	68 .60	69 .80	70 .18	71 .13	72 .06
73 .17	74 .29	75 .51	76 1.02	77 .42	78 .49	79 .59	80 .99	81 .48	82 .27	83 .19	84 .10
85 .09	86 .15	87 .42	88 .84	89 .40	90 .30	91 .19	92 .56	93 .16	94 .09	95 .09	96 .07
97 .07	98 .16	99 .33	100 .70	101 .46	102 .36	103 .30	104 .56	105 .12	106 Trace	107 Trace	108 Trace
109 .06	110 .11	111 .17	112 .23	113 .25	114 .35	115 .27	116 .33	117 .11	118 .05	119 Trace	120 Trace
121 Trace	122 .07	123 .11	124 .13	125 .15	126 .14	127 .18	128 .17	129 .10	130 .05	131 Trace	132 Trace
133 Trace	134 Trace	135 .06	136 .07	137 .08	138 .09	139 .12	140 .14	141 .08	142 .04	143 Trace	144 Trace

TIME OF RUN 5' 13 4/5"

GAGE PRESSURE 43.8 #

TRUE PRESSURE 45 #

DISCHARGE GAL/MIN. 36.6

TRACES = .94 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 23, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 12"

1	2	3	4	5	6	7	8	9	10	11	12
Trace	Trace	.06	.09	.09	.06	Trace	Trace	Trace	Trace	Trace	Trace
13	14	15	16	17	18	19	20	21	22	23	24
Trace	.06	.15	.21	.19	.14	.08	.06	Trace	Trace	Trace	Trace
25	26	27	28	29	30	31	32	33	34	35	36
.06	.12	.23	.13	.40	.29	.18	.12	.11	Trace	Trace	Trace
37	38	39	40	41	42	43	44	45	46	47	48
.10	.19	.32	.68	.59	.47	.40	.37	.34	.11	Trace	Trace
49	50	51	52	53	54	55	56	57	58	59	60
.15	.22	.34	.97	.26	.25	.31	.36	.89	.15	Trace	Trace
61	62	63	64	65	66	67	68	69	70	71	72
.24	.36	.47	1.08	.58	.29	.22	.59	1.18	.24	.15	.07
73	74	75	76	77	78	79	80	81	82	83	84
.21	.42	.77	1.15	.60	.52	.60	1.14	.59	.42	.27	.12
85	86	87	88	89	90	91	92	93	94	95	96
.09	.20	.46	.78	.48	.35	.21	.82	.21	.11	.10	.08
97	98	99	100	101	102	103	104	105	106	107	108
.09	.21	.80	.72	.46	.38	.20	.71	.19	Trace	Trace	Trace
109	110	111	112	113	114	115	116	117	118	119	120
.10	.20	.26	.35	.36	.44	.29	.32	.11	Trace	Trace	Trace
121	122	123	124	125	126	127	128	129	130	131	132
.08	.13	.17	.20	.19	.18	.21	.18	.09	Trace	Trace	Trace
133	134	135	136	137	138	139	140	141	142	143	144
Trace	.07	.10	.12	.11	.12	.15	.16	.08	Trace	Trace	Trace

TIME OF RUN 4'15"

GAGE PRESSURE 64.1#

TRUE PRESSURE 65#

DISCHARGE GAL IN MIN 44.8

TRACES = 1.02 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 15, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 Trace	2 Trace	3 Trace	4 .04	5 .04	6 .04	7 .04	8 .03	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 .02	15 .03	16 .05	17 .06	18 .07	19 .06	20 .05	21 .04	22 Trace	23 Trace	24 Trace
25 Trace	26 .04	27 .06	28 .07	29 .10	30 .11	31 .09	32 .07	33 .05	34 .03	35 Trace	36 Trace
37 .04	38 .08	39 .10	40 .11	41 .14	42 .23	43 .18	44 .11	45 .06	46 .05	47 .04	48 Trace
49 .07	50 .13	51 .15	52 .14	53 .30	54 .44	55 .44	56 .36	57 .09	58 .06	59 .05	60 .03
61 .08	62 .14	63 .16	64 .17	65 .49	66 .05	67 .08	68 .41	69 .15	70 .09	71 .06	72 .04
73 .07	74 .11	75 .12	76 .18	77 .37	78 .11	79 .38	80 .37	81 .10	82 .09	83 .07	84 .05
85 .05	86 .08	87 .09	88 .14	89 .45	90 .15	91 .19	92 .22	93 .06	94 .07	95 .08	96 .05
97 .04	98 .06	99 .07	100 .10	101 .21	102 .55	103 .37	104 .15	105 .04	106 .03	107 .05	108 .04
109 .04	110 .04	111 .06	112 .08	113 .11	114 .17	115 .11	116 .09	117 .07	118 .04	119 Trace	120 Trace
121 Trace	122 .03	123 .05	124 .06	125 .07	126 .12	127 .07	128 .07	129 .05	130 .04	131 Trace	132 Trace
133 Trace	134 .02	135 .03	136 .05	137 .05	138 .05	139 .05	140 .04	141 .04	142 .03	143 Trace	144 Trace

TIME OF RUN 8'31"

GAGE PRESSURE 8.1#

TRUE PRESSURE 10#

DISCHARGE GAL./MIN. 18.8

TRACES = .39 GAL.

SPRINKLER DISTRIBUTION TESTS

May 15, 1907.

Plane

Manufacturers

Upright

DISTANCE OF HEAD FROM CEILING 4"

Trace	Trace	.06	.07	.11	.13	.14	.08	Trace	Trace	Trace	Trace
Trace	.06	.09	.11	.15	.20	.19	.13	.06	Trace	Trace	Trace
.07	.12	.16	.22	.49	.76	.46	.23	.10	.05	Trace	Trace
.11	.19	.26	.46	.56	.34	.46	.65	.34	.08	.05	Trace
.14	.23	.32	.58	.32	.18	.15	.21	.89	.11	.07	.05
.14	.20	.30	.74	.32	.20	.13	.14	.58	.27	.09	.06
.11	.16	.25	.70	.16	.34	.38	.35	.41	.12	.10	.07
.08	.11	.27	.58	.21	.20	.12	.20	.18	.06	.08	.08
.06	.08	.21	.53	.44	.21	.14	.44	.07	.05	.05	.06
Trace	.07	.11	.27	.59	1.02	.57	.61	.14	Trace	Trace	Trace
Trace	.06	.09	.18	.24	.28	.27	.17	.08	.06	Trace	Trace
Trace	.05	.07	.14	.19	.14	.12	.10	.06	.04	Trace	Trace

TIME OF RUN 5'0"

GAGE PRESSURE 43.8#

TRUE PRESSURE 45#

DISCHARGE GAL./MIN. 36.8

TRACES = .72 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 15, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 Trace	2 Trace	3 .07	4 .10	5 .14	6 .17	7 .16	8 .10	9 .05	10 Trace	11 Trace	12 Trace
13 Trace	14 .08	15 .14	16 .19	17 .36	18 .39	19 .29	20 .14	21 .07	22 Trace	23 Trace	24 Trace
25 .09	26 .16	27 .23	28 .47	29 .77	30 .76	31 .76	32 .48	33 .18	34 .07	35 Trace	36 Trace
37 .14	38 .04	39 .34	40 .67	41 .32	42 .16	43 .23	44 .57	45 .66	46 .15	47 Trace	48 Trace
49 .17	50 .28	51 .42	52 .77	53 .20	54 .15	55 .16	56 .17	57 1.06	58 .17	59 .07	60 Trace
61 .16	62 .24	63 .39	64 .88	65 .31	66 .36	67 .16	68 .14	69 .58	70 .52	71 .12	72 .07
73 .11	74 .16	75 .41	76 .73	77 .23	78 .34	79 .37	80 .26	81 .65	82 .14	83 .11	84 .08
85 .09	86 .12	87 .58	88 .39	89 .28	90 .25	91 .13	92 .22	93 .26	94 .10	95 .09	96 .09
97 .06	98 .09	99 .44	100 .43	101 .28	102 .23	103 .15	104 .24	105 .14	106 .05	107 .06	108 .06
109 .05	110 .07	111 .17	112 .54	113 .69	114 .73	115 .24	116 .73	117 .24	118 Trace	119 Trace	120 Trace
121 Trace	122 .07	123 .11	124 .26	125 .42	126 .74	127 .69	128 .45	129 .13	130 .06	131 Trace	132 Trace
133 Trace	134 .05	135 .12	136 .18	137 .23	138 .20	139 .17	140 .12	141 .07	142 Trace	143 Trace	144 Trace

TIME OF RUN 4' 38"

GAGE PRESSURE 64.1 #

TRUE PRESSURE 65 #

DISCHARGE GALLONS 44.8

TRACES = .81 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 20, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 Trace	3 .02	4 .03	5 .03	6 .03	7 .02	8 .02	9 .02	10 .02	11 Trace	12 Trace
13 Trace	14 .03	15 .04	16 .05	17 .05	18 .05	19 .04	20 .04	21 .03	22 .03	23 .02	24 Trace
25 Trace	26 .04	27 .06	28 .09	29 .11	30 .10	31 .08	32 .07	33 .05	34 .05	35 .03	36 Trace
37 .03	38 .04	39 .09	40 .16	41 .23	42 .28	43 .16	44 .11	45 .08	46 .07	47 .05	48 .03
49 .03	50 .06	51 .12	52 .24	53 .40	54 .34	55 .35	56 .23	57 .10	58 .09	59 .08	60 .04
61 .04	62 .08	63 .15	64 .39	65 .26	66 .09	67 .13	68 .42	69 .12	70 .10	71 .08	72 .05
73 .06	74 .12	75 .16	76 .26	77 .29	78 .15	79 .39	80 .25	81 .15	82 .10	83 .07	84 .04
85 .06	86 .14	87 .18	88 .18	89 .31	90 .21	91 .21	92 .24	93 .11	94 .07	95 .05	96 .03
97 .05	98 .10	99 .17	100 .14	101 .22	102 .47	103 .38	104 .16	105 .06	106 .03	107 .03	108 .03
109 .03	110 .06	111 .09	112 .10	113 .12	114 .23	115 .16	116 .12	117 .07	118 .03	119 Trace	120 Trace
121 .02	122 .04	123 .05	124 .06	125 .07	126 .07	127 .07	128 .08	129 .05	130 .04	131 .03	132 Trace
133 Trace	134 .03	135 .03	136 .04	137 .04	138 .04	139 .05	140 .05	141 .04	142 .03	143 .03	144 .02

TIME OF RUN 9'30"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GAL./MIN. 18.8

TRACES = .20 GALS.

SPRINKLER DISTRIBUTION TESTS

DATE May 20, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 .06	3 .09	4 .11	5 .11	6 .09	7 .07	8 .05	9 .04	10 Trace	11 Trace	12 Trace
13 .04	14 .08	15 .13	16 .20	17 .24	18 .21	19 .14	20 .09	21 .07	22 .05	23 Trace	24 Trace
25 .06	26 .10	27 .17	28 .27	29 .27	30 .60	31 .43	32 .18	33 .10	34 .07	35 .05	36 Trace
37 .05	38 .15	39 .28	40 .49	41 .50	42 .38	43 .47	44 .47	45 .15	46 .11	47 .09	48 .05
49 .10	50 .22	51 .52	52 .44	53 .15	54 .16	55 .21	56 .72	57 .21	58 .13	59 .11	60 .07
61 .12	62 .23	63 .72	64 .41	65 .15	66 .16	67 .11	68 .58	69 .38	70 .14	71 .11	72 .07
73 .15	74 .24	75 .38	76 .70	77 .17	78 .49	79 .35	80 .19	81 .44	82 .15	83 .12	84 .07
85 .14	86 .22	87 .12	88 .69	89 .46	90 .19	91 .14	92 .14	93 .42	94 .23	95 .12	96 .07
97 .10	98 .17	99 .04	100 .61	101 .50	102 .23	103 .14	104 .16	105 .32	106 .11	107 .10	108 .07
109 .06	110 .12	111 .16	112 .29	113 .41	114 .78	115 .68	116 .60	117 .20	118 .08	119 .05	120 Trace
121 Trace	122 .08	123 .12	124 .16	125 .23	126 .43	127 .35	128 .21	129 .15	130 .09	131 .05	132 Trace
133 Trace	134 .05	135 .06	136 .14	137 .14	138 .12	139 .21	140 .25	141 .11	142 .07	143 .05	144 Trace

TIME OF RUN 6' 17 2/5"

GAGE PRESSURE 43.8 #

TRUE PRESSURE 45 #

DISCHARGE GAL'S/MIN 36.6

TRACES = .33 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 21, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Manufacturers

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 12"

1 Trace	2 Trace	3 .02	4 .03	5 .03	6 .03	7 .02	8 .02	9 .02	10 .02	11 Trace	12 Trace
13 Trace	14 .03	15 .03	16 .04	17 .05	18 .04	19 .04	20 .03	21 .04	22 .03	23 .02	24 Trace
25 .02	26 .03	27 .05	28 .07	29 .09	30 .08	31 .07	32 .06	33 .05	34 .05	35 .03	36 .02
37 .03	38 .04	39 .07	40 .04	41 .20	42 .24	43 .18	44 .11	45 .08	46 .07	47 .06	48 .03
49 .05	50 .05	51 .11	52 .23	53 .40	54 .38	55 .32	56 .23	57 .11	58 .10	59 .08	60 .04
61 .04	62 .08	63 .14	64 .35	65 .25	66 .09	67 .15	68 .37	69 .12	70 .11	71 .09	72 .05
73 .05	74 .12	75 .18	76 .34	77 .24	78 .17	79 .35	80 .25	81 .15	82 .10	83 .07	84 .04
85 .06	86 .05	87 .18	88 .19	89 .30	90 .17	91 .18	92 .22	93 .12	94 .06	95 .05	96 .03
97 .05	98 .12	99 .15	100 .16	101 .30	102 .39	103 .37	104 .16	105 .06	106 .03	107 .03	108 .03
109 .03	110 .06	111 .09	112 .11	113 .16	114 .27	115 .18	116 .11	117 .07	118 .04	119 Trace	120 Trace
121 .02	122 .04	123 .05	124 .07	125 .07	126 .07	127 .07	128 .07	129 .05	130 .04	131 .03	132 Trace
133 .02	134 .03	135 .04	136 .04	137 .04	138 .04	139 .05	140 .05	141 .04	142 .04	143 .03	144 .02

TIME OF RUN 11' 0 3/5"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GALLONS 18.8

TRACES = .16 GAL.

STRUCTURE: Joisted

May 7, 1907.

NAME: Grinnell

POSITION: Upright

DISTANCE BETWEEN CL. INS.: 4"

Trace	Trace	Trace	Trace	.04	.03	Trace	Trace	Trace	Trace	Trace	Trace
.03	Trace	.03	.05	.06	.05	.04	.04	Trace	Trace	Trace	Trace
Trace	.05	.05	.06	.07	.07	.07	.05	.04	.07	.04	Trace
Trace	.05	.09	.10	.14	.10	.10	.06	.04	.08	.07	.03
Trace	Trace	.09	.31	.29	.07	.17	.15	.18	.11	.10	.06
.08	.19	.31	.47	.60	.05	.11	.23	.46	.12	.09	.07
.09	.21	.28	.36	.57	.06	.27	.22	.67	.18	.12	.07
.04	.07	.10	.12	.32	.13	.11	.21	.23	.07	.04	Trace
Trace	.07	.12	.12	.09	.07	.14	.14	.08	.03	Trace	Trace
Trace	.05	.09	.09	.05	.08	.06	.07	.06	Trace	Trace	Trace
Trace	.03	.05	.05	.03	.04	.04	.04	.04	.03	Trace	Trace
Trace	Trace	Trace	Trace	Trace	Trace	Trace	.03	.03	.03	.03	Trace

TIME UNIT: 7'1"

GAGE PRESSURE: 8.1 #

TRUE PRESSURE: 10 #

DISCHARGE GALLONS: 17.8

TRACES = .88 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 7, 1902

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 Trace	2 Trace	3 Trace	4 .09	5 .11	6 .11	7 .09	8 .07	9 .07	10 Traces	11 Trace	12 Trace
13 Trace	14 .08	15 .09	16 .10	17 .11	18 .13	19 .11	20 .09	21 .06	22 Trace	23 Trace	24 Trace
25 Trace	26 .19	27 .24	28 .13	29 .10	30 .10	31 .10	32 .11	33 .06	34 .06	35 .09	36 Trace
37 Trace	38 .16	39 .83	40 .24	41 .09	42 .07	43 .09	44 .17	45 .10	46 .11	47 .14	48 .09
49 .09	50 .12	51 .31	52 .45	53 .25	54 .07	55 .11	56 .66	57 .32	58 .29	59 .20	60 .13
61 .47	62 .36	63 .34	64 1.16	65 .65	66 .07	67 .09	68 .19	69 1.09	70 .69	71 .35	72 .15
73 .34	74 .52	75 .60	76 1.42	77 .52	78 1.14	79 .31	80 .19	81 .77	82 .96	83 .50	84 .22
85 .06	86 .31	87 .14	88 .49	89 .15	90 .16	91 .11	92 .15	93 .63	94 .59	95 .15	96 .07
97 Trace	98 .17	99 .30	100 .33	101 .18	102 .19	103 .11	104 .11	105 .44	106 .21	107 .07	108 Trace
109 Trace	110 .11	111 .17	112 .14	113 .09	114 .14	115 .11	116 .12	117 .13	118 .18	119 .09	120 Trace
121 Trace	122 .06	123 .09	124 .09	125 Trace	126 .06	127 .09	128 .09	129 .10	130 .10	131 .10	132 Trace
133 Trace	134 Trace	135 Trace	136 Trace	137 Trace	138 Trace	139 .07	140 .07	141 Trace	142 Trace	143 Trace	144 Trace

TIME OF RUN 3' 29 3/5"

GAGE PRESSURE 43.8#

TRUE PRESSURE 45#

DISCHARGE GAL./MIN 36.8

TRACES = 1.28 gals.

SPRINKLER DISTRIBUTION TESTS

May 8, 1907.

Joisted.

Grinnell.

Upright.

DISTANCE OF HEAD FROM CEILING 4"

.09	.10	.10	.10	.15	.16	.09	Trace	Trace	Trace	Trace	Trace
.11	.13	.09	.10	.12	.17	.11	.06	Trace	Trace	Trace	Trace
.12	.15	.10	.09	.10	.17	.13	.09	Trace	Trace	.08	Trace
.14	.68	.39	.10	.07	.09	.13	.16	.08	.12	.17	.11
.04	.31	1.08	.36	.24	.09	.14	.80	.56	.37	.25	.15
.30	.19	.67	1.06	1.35	.12	.16	.21	.92	1.26	.57	.23
.23	.61	.75	1.66	.78	.12	.28	.13	.44	1.98	.59	.26
.06	.22	.36	.44	.15	.17	.08	.14	.69	1.08	.18	.10
.06	.25	.48	.52	.26	.27	.13	.13	.42	.46	.16	Trace
Trace	.15	.24	.20	.11	.16	.15	.12	.09	.13	.16	Trace
Trace	.08	.10	.10	.06	.08	.10	.12	.10	.10	.12	.08
Trace	Trace	Trace	Trace	Trace	Trace	.08	.10	.10	.09	.09	.08

2'57⅛"

GAL. PRESSURE 64.1 #

65 #

DISCHARGE 44.5

TRACES = .90 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 1, 1907.

CONSTRUCTION OF CEILING Joisted.

NAME OF HEAD Grinnell.

POSITION OF HEAD Upright.

DISTANCE OF HEAD FROM CEILING 8".

1 Trace	2 Trace	3 .02	4 .04	5 .05	6 .03	7 .03	8 .03	9 .03	10 Trace	11 Trace	12 Trace
13 Trace	14 .03	15 .03	16 .06	17 .07	18 .05	19 .05	20 .04	21 .04	22 .04	23 Trace	24 Trace
25 Trace	26 .04	27 .06	28 .09	29 .12	30 .09	31 .07	32 .06	33 .04	34 .07	35 .04	36 Trace
37 Trace	38 .04	39 .10	40 .13	41 .18	42 .11	43 .13	44 .06	45 .05	46 .10	47 .07	48 .04
49 .03	50 .06	51 .15	52 .39	53 .18	54 .06	55 .18	56 .14	57 .16	58 .19	59 .07	60 .06
61 .06	62 .17	63 .23	64 .51	65 .13	66 .06	67 .10	68 .15	69 .25	70 .10	71 .09	72 .06
73 .19	74 .16	75 .29	76 .39	77 .22	78 .08	79 .23	80 .12	81 .36	82 .11	83 .09	84 .06
85 .05	86 .08	87 .13	88 .24	89 .23	90 .13	91 .10	92 .17	93 .19	94 .10	95 .06	96 .04
97 .03	98 .02	99 .08	100 .20	101 .12	102 .11	103 .06	104 .18	105 .09	106 .03	107 .03	108 .02
109 .02	110 .05	111 .10	112 .10	113 .06	114 .09	115 .09	116 .09	117 .07	118 .03	119 Trace	120 Trace
121 Trace	122 .03	123 .06	124 .05	125 .04	126 .04	127 .05	128 .05	129 .04	130 .04	131 .02	132 Trace
133 Trace	134 .02	135 .03	136 .03	137 .03	138 .03	139 .04	140 .04	141 .03	142 .04	143 .03	144 Trace

TIME OF RUN 8'16"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GAL./MIN. 17.8

TRACES = .30 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 30, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 .07	3 .11	4 .13	5 .12	6 .13	7 .15	8 .11	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 .11	15 .16	16 .16	17 .13	18 .12	19 .15	20 .15	21 .08	22 Trace	23 Trace	24 Trace
25 Trace	26 .07	27 .13	28 .19	29 .17	30 .09	31 .13	32 .20	33 .08	34 .06	35 .09	36 Trace
37 Trace	38 Trace	39 .19	40 .24	41 .15	42 .11	43 .08	44 .27	45 .13	46 .11	47 .13	48 .08
49 .09	50 .13	51 .35	52 .93	53 .19	54 .11	55 .08	56 .52	57 .31	58 .37	59 .27	60 .13
61 .33	62 .35	63 .41	64 1.24	65 .24	66 .09	67 .11	68 .16	69 .33	70 .77	71 .29	72 .15
73 .24	74 .46	75 .46	76 1.06	77 .42	78 .13	79 .27	80 .19	81 .32	82 .96	83 .36	84 .15
85 Trace	86 .17	87 .37	88 .64	89 .23	90 .16	91 .12	92 .19	93 .53	94 .56	95 .27	96 .11
97 Trace	98 .13	99 .39	100 .56	101 .27	102 .27	103 .12	104 .15	105 .58	106 .21	107 .14	108 .07
109 Trace	110 .09	111 .15	112 .14	113 .10	114 .22	115 .18	116 .19	117 .16	118 .08	119 Trace	120 Trace
121 Trace	122 .05	123 .07	124 .07	125 .06	126 .11	127 .14	128 .15	129 .13	130 .08	131 Trace	132 Trace
133 Trace	134 Trace	135 Trace	136 Trace	137 Trace	138 .07	139 .09	140 .11	141 .12	142 .11	143 .07	144 Trace

TIME OF RUN 3'46"

GAGE PRESSURE 43.8 #

TRUE PRESSURE 45 #

DISCHARGE GAL/MIN. 36.8

TRACES = .97 CAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 30, 1907.

CONSTRUCTION OF CEILING Joisted

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 .08	2 .12	3 .14	4 .17	5 .15	6 .21	7 .12	8 .10	9 .07	10 Trace	11 Trace	12 Trace
13 Trace	14 .09	15 .14	16 .17	17 .17	18 .20	19 .14	20 .10	21 Trace	22 Trace	23 Trace	24 Trace
25 Trace	26 .06	27 .19	28 .25	29 .18	30 .15	31 .19	32 .15	33 .05	34 .05	35 .07	36 Trace
37 Trace	38 .05	39 .22	40 .22	41 .14	42 .13	43 .15	44 .32	45 .10	46 .12	47 .15	48 .10
49 Trace	50 .12	51 .98	52 .95	53 .16	54 .12	55 .17	56 .83	57 .36	58 .49	59 .34	60 .18
61 .25	62 .39	63 .48	64 1.44	65 .27	66 .17	67 .23	68 .23	69 .32	70 .96	71 .48	72 .20
73 .19	74 .50	75 .50	76 1.18	77 .66	78 .15	79 .28	80 .13	81 .27	82 1.03	83 .51	84 .52
85 Trace	86 .21	87 .68	88 1.02	89 .23	90 .17	91 .11	92 .14	93 .78	94 .83	95 .38	96 .16
97 Trace	98 .19	99 .47	100 .51	101 .32	102 .35	103 .13	104 .16	105 .67	106 .34	107 .15	108 .10
109 Trace	110 .12	111 .21	112 .18	113 .12	114 .11	115 .30	116 .27	117 .19	118 .15	119 .08	120 .05
121 Trace	122 .07	123 .09	124 .08	125 .06	126 .11	127 .18	128 .16	129 .14	130 .11	131 Trace	132 Trace
133 Trace	134 Trace	135 Trace	136 Trace	137 Trace	138 .06	139 .12	140 .12	141 .12	142 .13	143 .09	144 Trace

TIME OF RUN 3' 14½"

GAL. PER MIN. 64.1 #

TOTAL PRESSURE 65 #

44.8

TRACES = .79 GAL.

SPRINKLER DISTRIBUTION

April 24, 1907.

Joisted.

NAME OF HEAD Grinnell.

Upright.

DISTANCE OF HEAD FROM CEILING 12".

.02	.03	.04	.04	.03	.03	.03	.03	.02	.02	.02	.02
.02	.04	.06	.05	.04	.05	.04	.04	.05	.04	.03	.03
.03	.05	.09	.10	.06	.07	.05	.04	.08	.07	.05	.03
.03	.08	.13	.18	.12	.11	.09	.05	.10	.14	.08	.04
.06	.14	.30	.25	.14	.11	.13	.11	.24	.09	.09	.06
.06	.12	.18	.28	.05	.05	.07	.16	.11	.08	.07	.06
.06	.11	.32	.18	.06	.08	.26	.08	.21	.12	.11	.46
.06	.16	.26	.22	.22	.09	.07	.15	.20	.12	.07	.06
.04	.10	.15	.17	.27	.17	.16	.20	.13	.05	.03	.03
.02	.05	.07	.18	.12	.16	.07	.13	.10	.06	.03	Trace
Trace	.03	.06	.10	.09	.04	.04	.05	.06	.05	.03	Trace
Trace	.02	.04	.05	.04	.04	.03	.03	.04	.04	.03	.03

LENGTH OF RUN 13'13"

GAUGE PRESSURE 8.1#

10#

DISCHARGE 17.8

TRACES = .06 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 24, 1907.

CONSTRUCTION OF CEILING Joisted.

NAME OF HEAD Grinnell.

POSITION OF HEAD Upright.

DISTANCE OF HEAD FROM CEILING 12".

1 .09	2 .13	3 .15	4 .13	5 .03	6 .05	7 .08	8 .06	9 .05	10 .05	11 Trace	12 Trace
13 .12	14 .16	15 .18	16 .17	17 .15	18 .17	19 .15	20 .10	21 .10	22 .10	23 .07	24 .04
25 .15	26 .21	27 .26	28 .19	29 .15	30 .14	31 .18	32 .13	33 .13	34 .18	35 .13	36 .07
37 .14	38 .40	39 .43	40 .24	41 .10	42 .11	43 .20	44 .14	45 .22	46 .15	47 .18	48 .09
49 .12	50 .80	51 .25	52 .17	53 .12	54 .11	55 .22	56 .19	57 .36	58 .57	59 .18	60 .09
61 .20	62 .39	63 .62	64 .44	65 .15	66 .18	67 .11	68 .16	69 .51	70 .31	71 .22	72 .10
73 .18	74 .50	75 .68	76 .24	77 .27	78 .20	79 .32	80 .16	81 .16	82 .66	83 .32	84 .09
85 .10	86 .26	87 .35	88 .50	89 .80	90 .12	91 .13	92 .13	93 .34	94 .60	95 .11	96 .09
97 .04	98 .09	99 .20	100 .42	101 .30	102 .21	103 .21	104 .15	105 .32	106 .43	107 .14	108 .06
109 Trace	110 .06	111 .15	112 .33	113 .21	114 .19	115 .18	116 .23	117 .39	118 .23	119 .09	120 .04
121 Trace	122 Trace	123 .09	124 .18	125 .15	126 .08	127 .09	128 .18	129 .22	130 .16	131 .12	132 .06
133 Trace	134 Trace	135 .05	136 .09	137 .07	138 .04	139 .05	140 .10	141 .16	142 .13	143 .09	144 .06

TIME OF RUN 6'0"

GAGE PRESSURE 43.8 #

TRUE PRESSURE 45 #

DISCHARGE GAL/MIN. 36.8

TRACES = .15 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE April 30, 1907.

CONSTRUCTION OF CEILING Joisted.

MAKE OF HEAD Grinnell.

POSITION OF HEAD Upright.

DISTANCE OF HEAD FROM CEILING 12"

1 .23	2 .13	3 .16	4 .19	5 .23	6 .21	7 .13	8 .10	9 Trace	10 Trace	11 Trace	12 Trace
13 .05	14 .11	15 .16	16 .27	17 .19	18 .24	19 .19	20 .14	21 Trace	22 Trace	23 Trace	24 Trace
25 Trace	26 .09	27 .21	28 .30	29 .18	30 .22	31 .20	32 .26	33 .07	34 .09	35 .10	36 .06
37 Trace	38 .07	39 .40	40 .22	41 .14	42 .15	43 .21	44 .41	45 .13	46 .17	47 .21	48 .14
49 Trace	50 .14	51 .47	52 .81	53 .13	54 .13	55 .21	56 .54	57 .33	58 .57	59 .53	60 .23
61 .18	62 .38	63 .37	64 .93	65 .16	66 .19	67 .24	68 .16	69 .19	70 .61	71 .34	72 .20
73 .17	74 .41	75 .42	76 .86	77 .41	78 .14	79 .33	80 .09	81 .12	82 .63	83 .54	84 .17
85 Trace	86 .18	87 .34	88 1.38	89 .14	90 .27	91 .16	92 .15	93 .44	94 .70	95 .57	96 .19
97 Trace	98 .20	99 .32	100 .60	101 .22	102 .39	103 .17	104 .15	105 .06	106 .80	107 .24	108 .13
109 Trace	110 .11	111 .29	112 .33	113 .17	114 .24	115 .15	116 .25	117 .31	118 .33	119 .09	120 Trace
121 Trace	122 .07	123 .13	124 .15	125 .09	126 .09	127 .17	128 .24	129 .29	130 .19	131 .09	132 Trace
133 Trace	134 Trace	135 .06	136 .06	137 Trace	138 Trace	139 .11	140 .18	141 .05	142 .30	143 .11	144 .06

TIME OF RUN 3'31"

GAGE PRESSURE 64.1 #

TRUE PRESSURE 65 #

DISCHARGE GALLONS 44.5

TRACES = .69 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 13, 1907

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 .02	2 .03	3 .04	4 .06	5 .07	6 .05	7 .04	8 .04	9 .03	10 .02	11 Trace	12 Trace
13 .03	14 .04	15 .06	16 .09	17 .10	18 .07	19 .06	20 .05	21 .03	22 .03	23 .04	24 Trace
25 Trace	26 .04	27 .06	28 .11	29 .14	30 .14	31 .09	32 .06	33 .04	34 .06	35 .09	36 .03
37 Trace	38 .03	39 .06	40 .12	41 .29	42 .30	43 .23	44 .10	45 .07	46 .09	47 .08	48 .05
49 .02	50 .04	51 .07	52 .25	53 .18	54 .05	55 .14	56 .20	57 .15	58 .11	59 .10	60 .06
61 .04	62 .06	63 .12	64 .53	65 .21	66 .41	67 .43	68 .21	69 .21	70 .08	71 .08	72 .06
73 .06	74 .09	75 .13	76 .23	77 .16	78 .09	79 .21	80 .11	81 .18	82 .06	83 .05	84 .05
85 .05	86 .10	87 .10	88 .14	89 .28	90 .15	91 .05	92 .21	93 .12	94 .06	95 .05	96 .04
97 .03	98 .08	99 .13	100 .15	101 .33	102 .39	103 .27	104 .24	105 .06	106 .03	107 .03	108 .03
109 .03	110 .06	111 .10	112 .09	113 .09	114 .09	115 .14	116 .11	117 .07	118 .03	119 Trace	120 Trace
121 .03	122 .05	123 .07	124 .06	125 .04	126 .04	127 .07	128 .06	129 .06	130 .04	131 .02	132 Trace
133 .03	134 .04	135 .04	136 .03	137 .03	138 .03	139 .05	140 .05	141 .04	142 .04	143 .03	144 Trace

TIME OF RUN 8'0"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GALLONS 17.8

TRACES = .13 GAL.

SPRINKLER DISTRIBUTION TESTS.

DATE. May 14, 1907.

CONSTRUCTION OF CEILING. Plane

NAME OF HEAD. Grinnell

POSITION OF HEAD. Upright

DISTANCE OF HEAD FROM CEILING. 4"

1 .05	2 .07	3 .10	4 .16	5 .40	6 .26	7 .11	8 .10	9 .06	10 .03	11 Trace	12 Trace
13 .05	14 .06	15 .14	16 .21	17 .37	18 .34	19 .30	20 .24	21 .06	22 .05	23 .05	24 .04
25 .09	26 .07	27 .20	28 .27	29 .27	30 .16	31 .17	32 .16	33 .09	34 .11	35 .12	36 .10
37 .09	38 .12	39 .28	40 .13	41 .12	42 .11	43 .09	44 .10	45 .14	46 .18	47 .19	48 .14
49 .08	50 .16	51 .27	52 .34	53 .10	54 .10	55 .11	56 .46	57 .23	58 .39	59 .28	60 .13
61 .07	62 .19	63 .57	64 .43	65 .09	66 .17	67 .12	68 .09	69 .35	70 .29	71 .14	72 .10
73 .12	74 .02	75 .45	76 .18	77 .09	78 .18	79 .12	80 .08	81 .20	82 .24	83 .11	84 .08
85 .09	86 .04	87 .26	88 .50	89 .10	90 .12	91 .08	92 .08	93 .18	94 .28	95 .10	96 .07
97 .07	98 .05	99 .35	100 .33	101 .46	102 .18	103 .11	104 .08	105 .23	106 .14	107 .10	108 .07
109 .07	110 .14	111 .25	112 .41	113 .64	114 .52	115 .18	116 .39	117 .28	118 .09	119 .05	120 .03
121 .05	122 .10	123 .12	124 .11	125 .09	126 .31	127 .51	128 .39	129 .29	130 .10	131 .04	132 Trace
133 .04	134 .07	135 .07	136 .06	137 .06	138 .12	139 .28	140 .15	141 .14	142 .12	143 .08	144 .04

TIME OF RUN. 7' 19 1/5"

GAGE PRESSURE. 43.8#

TRUE PRESSURE. 45#

DISCHARGE GAL./MIN. 36.8

TRACES = .07 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 14, 1907

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 4"

1 Trace	2 .10	3 .16	4 .24	5 .33	6 .34	7 .17	8 .20	9 .11	10 Trace	11 Trace	12 Trace
13 Trace	14 .10	15 .29	16 .42	17 .18	18 .26	19 .36	20 .21	21 .14	22 Trace	23 Trace	24 Trace
25 .09	26 .12	27 .18	28 .16	29 .18	30 .14	31 .11	32 .13	33 .14	34 .13	35 .15	36 .14
37 .13	38 .16	39 .36	40 .13	41 .14	42 .14	43 .12	44 .29	45 .15	46 .23	47 .28	48 .19
49 Trace	50 .10	51 .24	52 .40	53 .12	54 .14	55 .14	56 .46	57 .29	58 .30	59 .44	60 .17
61 Trace	62 .21	63 .63	64 .41	65 .12	66 .20	67 .29	68 .11	69 .23	70 .47	71 .22	72 .13
73 .16	74 .43	75 .50	76 .19	77 .11	78 .17	79 .24	80 .09	81 .13	82 .31	83 .16	84 .10
85 .08	86 .19	87 .43	88 .63	89 .13	90 .13	91 .10	92 .10	93 .11	94 .39	95 .20	96 .09
97 .07	98 .23	99 .50	100 .34	101 .35	102 .20	103 .12	104 .10	105 .17	106 .29	107 .16	108 .10
109 .07	110 .20	111 .41	112 .50	113 .93	114 .58	115 .13	116 .14	117 .13	118 .24	119 .08	120 .06
121 .05	122 .12	123 .17	124 .16	125 .14	126 .42	127 .29	128 .56	129 .44	130 .21	131 .06	132 Trace
133 Trace	134 .07	135 .07	136 .06	137 .07	138 .16	139 .44	140 .26	141 .22	142 .19	143 .10	144 .05

TIME OF RUN 3' 44⅕"

GAGE PRESSURE 64.1 #

TRUE PRESSURE 65 #

DISCHARGE GAL/MIN 44.5

TRACES = .58 GALS.

SPRINKLER DISTRIBUTION TESTS

DATE May 14, 1907

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 Trace	2 .03	3 .04	4 .07	5 .06	6 .04	7 .04	8 .03	9 Trace	10 Trace	11 Trace	12 Trace
13 Trace	14 .04	15 .06	16 .09	17 .11	18 .08	19 .06	20 .04	21 .03	22 .04	23 Trace	24 Trace
25 Trace	26 .04	27 .07	28 .12	29 .18	30 .24	31 .17	32 .07	33 .04	34 .06	35 .05	36 .03
37 Trace	38 .03	39 .07	40 .16	41 .23	42 .22	43 .16	44 .09	45 .05	46 .09	47 .07	48 .04
49 Trace	50 .04	51 .07	52 .08	53 .12	54 .05	55 .07	56 .18	57 .17	58 .15	59 .11	60 .06
61 .05	62 .08	63 .15	64 .33	65 .08	66 .04	67 .10	68 .15	69 .17	70 .09	71 .08	72 .07
73 .07	74 .11	75 .29	76 .20	77 .10	78 .08	79 .22	80 .09	81 .14	82 .06	83 .05	84 .05
85 .04	86 .09	87 .11	88 .12	89 .17	90 .08	91 .06	92 .10	93 .22	94 .06	95 .05	96 .04
97 .03	98 .07	99 .13	100 .19	101 .29	102 .34	103 .20	104 .26	105 .13	106 .03	107 .03	108 .03
109 .02	110 .05	111 .11	112 .05	113 .13	114 .14	115 .26	116 .16	117 .09	118 .04	119 Trace	120 Trace
121 Trace	122 .04	123 .07	124 .07	125 .05	126 .05	127 .08	128 .08	129 .06	130 .05	131 .04	132 Trace
133 Trace	134 .03	135 .04	136 .04	137 .03	138 .03	139 .05	140 .05	141 .04	142 .04	143 .03	144 .03

TIME OF RUN 9'35"

GAGE PRESSURE 8.1#

TRUE PRESSURE 10#

DISCHARGE GAL/MIN 17.8

TRACES = .31 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 14, 1907

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Upright

DISTANCE OF HEAD FROM CEILING 8"

1 .10	2 .12	3 .13	4 .20	5 .35	6 .27	7 .13	8 .12	9 .07	10 Trace	11 Trace	12 Trace
13 .07	14 .15	15 .24	16 .33	17 .25	18 .33	19 .32	20 .28	21 .06	22 .05	23 .04	24 Trace
25 .06	26 .15	27 .26	28 .24	29 .16	30 .13	31 .11	32 .15	33 .08	34 .09	35 .10	36 .08
37 .06	38 .12	39 .32	40 .14	41 .14	42 .12	43 .11	44 .16	45 .14	46 .21	47 .21	48 .15
49 .06	50 .10	51 .30	52 .29	53 .12	54 .13	55 .14	56 .38	57 .24	58 .41	59 .29	60 .15
61 .11	62 .52	63 .50	64 .17	65 .08	66 .14	67 .16	68 .13	69 .27	70 .27	71 .14	72 .11
73 .14	74 .33	75 .30	76 .17	77 .11	78 .18	79 .32	80 .09	81 .17	82 .26	83 .13	84 .09
85 .10	86 .19	87 .34	88 .48	89 .16	90 .12	91 .08	92 .10	93 .14	94 .36	95 .16	96 .10
97 .06	98 .17	99 .32	100 .31	101 .37	102 .22	103 .09	104 .08	105 .14	106 .21	107 .15	108 .11
109 .04	110 .11	111 .27	112 .36	113 .44	114 .51	115 .11	116 .11	117 .15	118 .22	119 .06	120 .06
121 .04	122 .10	123 .15	124 .16	125 .16	126 .34	127 .35	128 .47	129 .38	130 .18	131 .06	132 Trace
133 .04	134 .08	135 .08	136 .08	137 .10	138 .11	139 .22	140 .18	141 .17	142 .17	143 .13	144 .06

TIME OF RUN 6' 31 4/5"

6' HD. DISCH. 43.8 #

45 #

36.8

TRACES = .11 GAL.

DATE May 15, 1907.

CONSTRUCTION OF CEILING Plane.

NAME OF HEAD Grinnell.

POSITION OF HEAD Upright.

DISTANCE OF HEAD FROM CEILING 12".

.03	.03	.04	.06	.05	.04	.03	.03	.03	.02	Trace	Trace
.03	.05	.06	.08	.08	.05	.05	.04	.04	.03	.02	Trace
.03	.05	.11	.14	.18	.19	.16	.05	.04	.06	.04	.02
.02	.05	.12	.19	.20	.17	.17	.06	.05	.09	.06	.04
.03	.06	.12	.24	.10	.07	.11	.09	.13	.18	.16	.05
.06	.12	.23	.19	.05	.05	.06	.12	.13	.10	.09	.06
.08	.15	.30	.10	.05	.08	.21	.10	.12	.06	.06	.05
.05	.10	.13	.15	.08	.05	.05	.09	.17	.06	.04	.04
.04	.10	.16	.19	.19	.26	.15	.15	.12	.04	.04	.03
.05	.06	.12	.23	.21	.22	.26	.16	.08	.03	.02	.02
.02	.05	.08	.08	.06	.06	.10	.08	.06	.04	.05	.01
.02	.04	.04	.04	.04	.04	.05	.05	.04	.04	.04	.03

TIME OF RUN 16' 0 3/5"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE 17.8

TRACES = .03 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 21, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Pendant

DISTANCE OF HEAD FROM CEILING Flush

1 .03	2 .02	3 Trace	4 .03	5 .05	6 .04	7 .03	8 .05	9 Trace	10 Trace	11 Trace	12 .03
13 .03	14 .04	15 .03	16 .02	17 .07	18 .05	19 .05	20 .04	21 Trace	22 Trace	23 .04	24 .06
25 Trace	26 .03	27 .05	28 .04	29 .09	30 .08	31 .08	32 .04	33 Trace	34 .03	35 .06	36 .08
37 Trace	38 Trace	39 .03	40 .07	41 .06	42 .18	43 .12	44 .04	45 .04	46 .06	47 .06	48 .07
49 Trace	50 Trace	51 .02	52 .06	53 .29	54 .17	55 .30	56 .07	57 .12	58 .04	59 .03	60 .03
61 .07	62 .09	63 .05	64 .04	65 .29	66 .03	67 .05	68 .09	69 .14	70 .03	71 .02	72 .02
73 .08	74 .06	75 .09	76 .16	77 .17	78 .02	79 .11	80 .16	81 .21	82 .10	83 .04	84 .03
85 .03	86 .03	87 .04	88 .06	89 .27	90 .12	91 .16	92 .10	93 .03	94 .04	95 .04	96 .04
97 Trace	98 Trace	99 Trace	100 .03	101 .13	102 .12	103 .21	104 .08	105 .02	106 Trace	107 Trace	108 .24
109 Trace	110 Trace	111 Trace	112 .06	113 .08	114 .09	115 .06	116 .09	117 .04	118 Trace	119 Trace	120 Trace
121 Trace	122 Trace	123 .02	124 .05	125 .05	126 .13	127 .08	128 .05	129 .05	130 .02	131 Trace	132 Trace
133 Trace	134 .02	135 .04	136 .05	137 .03	138 .07	139 .05	140 .03	141 .05	142 .05	143 .02	144 Trace

TIME OF RUN 13' 4"

GAGE PRESSURE 8.1 #

TRUE PRESSURE 10 #

DISCHARGE GAL./MIN. 20.2

TRACES = .31 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 21, 1907

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Pendant

DISTANCE OF HEAD FROM CEILING Flush.

1 .07	2 .08	3 .08	4 .07	5 .13	6 .08	7 .06	8 .08	9 .04	10 .02	11 .04	12 .07
13 .09	14 .06	15 .07	16 .08	17 .11	18 .13	19 .09	20 .07	21 .03	22 .04	23 .07	24 .10
25 .03	26 .06	27 .06	28 .07	29 .09	30 .26	31 .13	32 .09	33 .04	34 .06	35 .10	36 .05
37 .03	38 .03	39 .08	40 .09	41 .32	42 .25	43 .11	44 .14	45 .08	46 .12	47 .09	48 .04
49 .04	50 .04	51 .04	52 .11	53 .20	54 .05	55 .20	56 .30	57 .11	58 .10	59 .05	60 .04
61 .05	62 .05	63 .07	64 .18	65 .28	66 .04	67 .05	68 .06	69 .04	70 .16	71 .17	72 .09
73 .08	74 .07	75 .12	76 .08	77 .04	78 .04	79 .06	80 .21	81 .16	82 .11	83 .10	84 .15
85 .09	86 .11	87 .19	88 .26	89 .29	90 .04	91 .05	92 .22	93 .06	94 .04	95 .04	96 .04
97 .02	98 .02	99 .03	100 .14	101 .17	102 .24	103 .03	104 .08	105 .04	106 Trace	107 Trace	108 Trace
109 Trace	110 Trace	111 .03	112 .08	113 .13	114 .19	115 .24	116 .16	117 .06	118 .02	119 Trace	120 Trace
121 Trace	122 .02	123 .06	124 .12	125 .08	126 .17	127 .12	128 .09	129 .11	130 .05	131 .02	132 Trace
133 Trace	134 .03	135 .09	136 .05	137 .06	138 .11	139 .08	140 .07	141 .12	142 .05	143 .07	144 Trace

TIME OF RUN 14'28"

GAGE PRESSURE 43.8 #

TRUE PRESSURE 45 #

DISCHARGE GAL./MIN. 40.2

TRACES = .12 GAL.

SPRINKLER DISTRIBUTION TESTS

DATE May 26, 1907.

CONSTRUCTION OF CEILING Plane

NAME OF HEAD Grinnell

POSITION OF HEAD Pendant

DISTANCE OF HEAD FROM CEILING Flush

1 .06	2 .07	3 .07	4 .08	5 .11	6 .11	7 .08	8 .07	9 .06	10 .03	11 .04	12 .06
13 .04	14 .05	15 .07	16 .08	17 .02	18 .27	19 .12	20 .08	21 .05	22 .04	23 .06	24 .09
25 .04	26 .06	27 .05	28 .17	29 .11	30 .10	31 .15	32 .11	33 .05	34 .06	35 .09	36 .10
37 .02	38 .05	39 .09	40 .12	41 .41	42 .17	43 .12	44 .17	45 .09	46 .11	47 .12	48 .06
49 .04	50 .04	51 .02	52 .12	53 .06	54 .05	55 .20	56 .33	57 .06	58 .16	59 .06	60 .06
61 .06	62 .07	63 .11	64 .23	65 .18	66 .04	67 .07	68 .04	69 .04	70 .07	71 .17	72 .15
73 .08	74 .12	75 .14	76 .06	77 .04	78 .05	79 .07	80 .19	81 .19	82 .12	83 .09	84 .13
85 .09	86 .15	87 .26	88 .27	89 .18	90 .05	91 .07	92 .23	93 .09	94 .04	95 .04	96 .05
97 Trace	98 .03	99 .04	100 .23	101 .17	102 .20	103 .31	104 .09	105 .05	106 Trace	107 Trace	108 Trace
109 Trace	110 Trace	111 .03	112 .09	113 .12	114 .19	115 .28	116 .22	117 .07	118 .03	119 Trace	120 Trace
121 Trace	122 Trace	123 .05	124 .10	125 .09	126 .19	127 .17	128 .12	129 .11	130 .06	131 .03	132 Trace
133 Trace	134 .02	135 .08	136 .13	137 .07	138 .15	139 .11	140 .08	141 .13	142 .08	143 .05	144 Trace

TIME OF RUN 11' 24 4/5"

GAGE PRESSURE 64.1 #

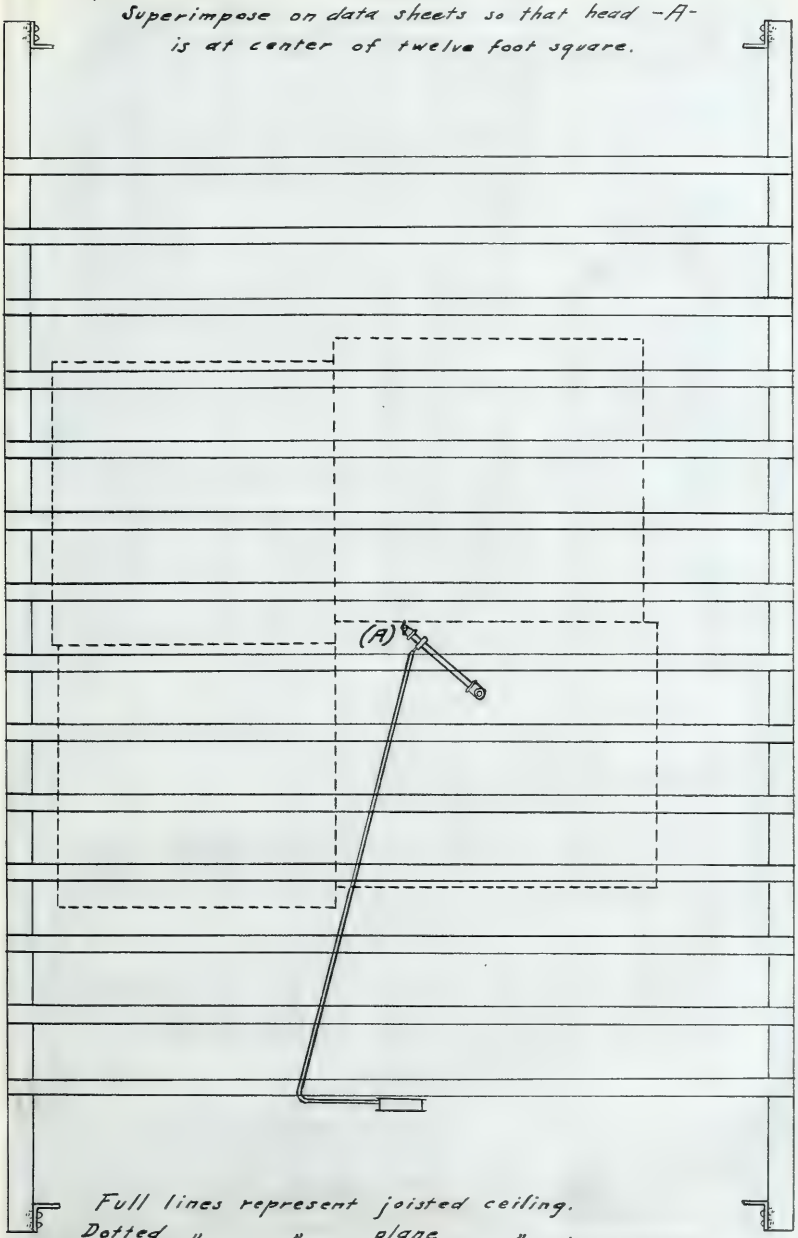
TRUE PRESSURE 65 #

DISCHARGE GAL/MIN 49.0

TRACES = .17 GAL.

CEILING DIAGRAM.

Superimpose on data sheets so that head -A- is at center of twelve foot square.



Full lines represent joisted ceiling.
Dotted " " plane " .

CALIBRATION OF MANUFACTURERS' HEAD, HUNG UPRIGHT

No. of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	3	57.00	105.00	48.00	9.600							
	"	105.00	152.00	47.00	9.400							
	"	152.00	198.00	46.00	9.200							
	"	83.00	128.00	45.00	9.000							
	"	128.00	172.00	44.00	8.800							
	"	172.00	216.00	44.00	8.800							
	"	111.00	156.25	45.25	9.050	9.121	-3.10	+4.05	.85	1.491	.112	1.385
2	3	90.00	148.00	58.00	14.500							
	"	149.00	190.70	41.70	10.167							
	"	110.00	153.35	43.25	14.417							
	"	153.25	196.24	43.00	14.333	14.354	-5.95	+7.65	.85	4.555	.278	4.277
3	3	89.00	138.00	48.00	16.333							
	"	138.00	186.75	48.75	16.250							
	"	91.00	140.00	49.00	16.333							
	"	140.00	189.00	49.00	16.333	16.312	-7.15	+9.20	.85	5.859	.339	5.520
4	3	123.25	175.25	52.00	17.333							
	"	175.25	226.25	51.00	17.000							
	"	115.50	167.00	51.50	17.167							
	"	167.00	218.50	51.50	17.167	17.167	-11.18	+14.1	.85	10.090	.398	9.692
5	3	91.00	148.25	57.25	19.083							
	"	148.25	205.50	57.25	19.083							
	"	66.00	123.25	57.25	19.083							
	"	97.50	155.25	57.75	19.250	19.125	-13.4	+17.0	.85	12.488	.494	11.994
6	3	114.75	183.25	68.50	22.833							
	"	119.75	189.00	69.25	23.083							
	"	119.75	188.50	68.75	22.917							
	"	120.00	189.00	69.00	23.000	22.958	-10.8	+23.8	.85	18.271	.712	17.559

							Gage #54	TRUE			
7	3	100.00	185.00	85.00	28.333						
	"	100.00	185.25	85.25	28.417						
	"	100.00	185.25	85.25	28.417						
	"	104.75	189.75	85.00	28.333						
	"	110.50	195.00	84.50	28.167	28.333	32#	30*	28.301	1.123	27.208
8	3	102.25	201.50	99.25	33.083						
	"	110.00	209.00	99.00	33.000						
	"	120.00	219.00	99.00	33.000						
	"	105.00	204.00	99.00	33.000	33.021	42	39.8	38.181	1.473	36.708
9	3	95.00	212.50	117.50	39.167						
	"	95.50	213.00	117.50	39.167						
	"	93.00	210.00	117.00	39.000						
	"	90.00	207.00	117.00	39.000	39.084	57	55	54.381	2.063	52.318
10	3	86.50	223.50	137.00	45.667						
	"	86.00	223.50	137.50	45.833						
	"	85.00	222.50	137.50	45.833						
	"	88.50	226.00	137.50	45.833	45.792	77	74.7	73.001	2.822	69.259

CALIBRATION OF MANUFACTURERS' HEAD HUNG PENDANT

No. of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	6	60.00	110.75	42.75	7.125							
	"	110.75	160.50	49.75	7.107							
	"	95.50	145.75	50.25	7.179							
	"	145.75	187.50	41.75	6.928	7.102	-2.85	+2.60	.9"	.674	.068	.606
	7	142.50	192.50	50.00	7.143							
2	4	122.50	168.50	46.00	11.500							
	"	118.75	164.75	46.00	11.500							
	"	164.75	210.50	45.75	11.438							
	"	112.00	158.25	46.25	11.563	11.500	-4.45	+4.70	.9	2.429	.179	2.250
3	4	65.50	131.00	65.50	16.375							
	3	131.00	179.50	48.50	16.167							
	"	179.50	229.50	50.00	16.667							
	"	86.50	135.75	49.25	16.417							
	"	135.75	185.00	49.25	16.417	16.409	+.713	+.81	.9	5.312	.364	4.948
4	3	59.00	115.00	56.00	18.667							
	"	115.00	170.75	55.75	18.583							
	"	70.75	126.00	55.25	18.417							
	"	63.50	118.75	55.25	18.417	18.521	-.868	+10.00	.9	6.947	.463	6.484
5	4	18.75	208.00	89.75	22.313							
	3	58.50	125.25	66.75	22.250							
	3	125.25	192.00	66.75	22.250	22.271	-11.7	+13.75	.9	10.156	.670	9.486
6	3	61.50	138.00	76.50	25.500							
	"	38.00	213.50	75.50	25.167							
	"	76.25	152.50	76.25	25.417							
	"	152.50	227.50	75.00	25.000							
	"	106.50	181.75	75.25	25.083	25.234	-14.65	+17.58	9	13.357	.860	12.497

							Gage #54	True			
7	3	62.50	151.00	88.50	29.500						
	"	89.00	177.50	88.50	29.500						
	"	61.75	150.00	88.25	29.417	29.472	32#	30#	28.381	1.173	27.208
8	3	63.50	167.00	103.50	34.500						
	"	88.25	191.00	102.75	34.250						
	"	90.25	193.25	103.00	34.333						
	"	92.25	195.25	103.00	34.333	34.354	42	398	38.181	1.594	36.587
9	3	52.50	174.00	121.50	40.500						
	"	95.50	217.00	121.50	40.500						
	"	79.00	200.50	121.50	40.500	40.500	57	55	54.381	2.216	52.165
10	3	58.00	201.00	143.00	47.667						
	"	62.00	205.00	143.00	47.667						
	"	58.00	200.50	142.50	47.500						
	"	69.00	212.00	143.00	47.667	47.625	77	74.7	73.081	3.064	70.017

45.

46.

CALIBRATION OF GRINNELL HEAD, HUNG UPRIGHT

No of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	6	68.50	113.00	44.50	7.417							
	"	113.00	156.75	43.75	7.292							
	"	156.75	200.00	43.25	7.200							
	"	118.00	161.75	43.75	7.292							
	"	161.75	205.50	43.75	7.292	7.301	-3.15	+3.85	.75	1.410	.072	1.346
2	4	59.00	104.00	45.00	11.250							
	"	104.00	149.25	45.25	11.313							
	"	149.25	194.00	44.75	11.188							
	"	148.00	190.38	42.38	11.313	11.266	-5.55	+6.8	.75	3.953	.171	3.782
3	3	97.25	139.50	42.25	14.083							
	"	139.50	181.50	42.00	14.000							
	"	99.50	141.50	42.00	14.000							
	"	141.50	183.50	42.00	14.000	14.021	-7.8	+9.6	.75	6.346	.266	6.080
4	3	62.75	111.25	48.50	16.167							
	"	111.25	160.00	48.75	16.250							
	"	160.00	208.00	48.00	16.000							
	"	89.50	138.25	48.75	16.250							
	"	138.25	186.50	48.25	16.083	16.150	-9.9	+12.3	.75	8.523	.352	8.171
5	3	71.25	128.00	56.75	18.917							
	"	129.00	184.50	56.50	18.833							
	"	74.00	130.50	56.50	18.833							
	"	130.50	187.00	56.50	18.833	18.854	-12.9	+16.05	.75	11.823	.480	11.343
6	3	63.50	130.50	67.00	22.333							
	"	130.50	197.50	67.00	22.333							
	"	77.00	144.00	67.00	22.333							
	"	144.00	211.00	67.00	22.333	22.333	-17.5	+21.9	.75	16.777	.674	16.103

							Gage 54	True			
7	3	54.25	141.00	86.75	28.917						
	"	141.00	227.25	86.25	28.750						
	"	65.00	152.00	87.00	29.000						
	"	152.00	238.00	86.00	28.667	28.834	32*	30*	28.381	1.123	27.258
8	3	67.00	168.00	101.00	33.667						
	"	129.50	230.25	100.75	33.583						
	"	111.25	211.75	100.50	33.500						
	"	124.25	224.75	100.50	33.500	33.561	42	39.8	38.181	1.373	36.808
9	3	90.00	209.75	119.75	39.917						
	"	96.00	215.25	119.25	39.750						
	"	90.25	209.50	119.25	39.750						
	"	97.50	216.25	118.75	39.583	39.750	57	55	54.381	2.136	52.245
10	3	83.25	225.00	141.75	47.250						
	"	95.75	236.25	140.50	46.833						
	"	85.50	225.75	140.25	46.750						
	"	86.00	225.50	139.50	46.500						
	"	94.50	235.00	140.50	46.833	46.833	77	74.7	73.081	2.962	70.119

CALIBRATION OF GRINNELL HEAD, HUNG PENDANT

No. of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	5	58.75	103.75	45.00	9.000							
"	"	103.75	149.50	45.75	9.150							
"	"	149.50	195.00	45.50	9.100							
"	"	121.50	167.50	46.00	9.200							
"	"	168.50	214.00	45.50	9.100	9.110	-3.6	+4.45	1.00	1.925	.112	1.813
2	4	72.00	124.75	52.75	13.188							
"	"	124.75	177.50	52.75	13.188							
"	"	177.50	230.00	52.50	13.125							
"	"	107.75	160.25	52.50	13.125	13.156	-6.0	+7.4	1.00	4.460	.234	4.226
3	3	62.75	111.25	48.50	16.167							
"	"	111.25	160.25	49.00	16.333							
"	"	160.25	209.00	48.75	16.250							
"	"	121.00	169.50	48.50	16.167	16.229	-8.45	+10.4	1.00	7.042	.446	6.596
4	3	68.00	125.75	57.75	19.250							
"	"	125.75	183.50	57.75	19.250							
"	"	183.50	241.00	57.50	19.167							
"	"	146.25	198.00	51.75	19.250	19.229	-11.25	+14.00	1.00	10.078	.513	9.565
5	4	68.25	132.00	63.75	20.938							
"	3	132.00	194.75	62.75	20.917							
"	"	84.00	146.75	62.75	20.917							
"	"	146.75	209.25	62.50	20.833	20.901	-13.0	+16.2	1.00	11.950	.590	11.360
6	3	80.75	154.25	73.50	24.500							
"	"	154.25	227.25	73.00	24.333							
"	"	89.75	163.25	73.50	24.500							
"	"	236.25	309.25	73.00	24.333	24.417	-17.35	+21.6	1.00	16.536	805	15.721

							Gage Reading		True			
7	3	84.00	178.75	94.75	31.583							
"	"	127.50	221.75	94.25	31.417							
"	"	111.25	205.75	94.50	31.500							
"	"	121.25	215.50	94.25	31.417	31.479	32 #		30	28.381	1.339	27.042
8	3	74.25	184.00	109.75	36.583							
"	"	95.00	204.75	109.75	36.583							
"	"	101.50	211.50	110.00	36.667							
"	"	112.25	221.00	108.75	36.583	36.604	42 #		398	38.181	1.810	36.371
9	3	97.25	227.00	129.75	43.250							
"	"	99.00	228.75	129.75	43.250							
"	"	84.00	213.75	129.75	43.250							
"	"	39.75	169.50	129.75	43.250	43.250	57		55	54.381	2.547	51.834
10	3	72.00	224.00	152.00	50.667							
"	"	92.00	244.00	152.00	50.667							
"	"	92.25	244.25	152.00	50.667	50.667	77		74.7	73.081	3.460	69.613

CALIBRATION OF "INTERNATIONAL" HEAD, HUNG UPRIGHT

No of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	6	54.25	94.25	40.00	6.667							
	"	94.25	134.50	40.25	6.708							
	"	134.50	174.25	39.75	6.625							
	"	174.25	213.75	39.50	6.583	6.646	-2.50	+3.00	1.45	.731	.1058	.673
2	7	107.25	148.00	40.75	10.189							
	5	148.00	198.25	50.25	10.050							
	"	143.75	194.25	50.50	10.100							
	"	194.25	245.00	50.75	10.150	10.122	-4.4	+5.4	1.45	2.770	.139	2.631
3	4	34.00	89.50	55.50	13.875							
	"	89.50	145.50	56.00	14.000							
	"	145.50	201.00	55.50	13.875							
	"	183.00	238.00	55.00	13.750	13.875	-.80	+9.9	1.45	7.009	.260	6.749
4	3	63.25	118.00	54.75	18.250							
	"	118.00	172.25	54.25	18.250							
	"	172.25	227.25	54.50	18.167							
	"	96.25	151.25	55.00	18.333	18.250	-12.65	+15.8	1.45	11.611	.450	11.161
5	3	61.75	128.25	66.50	22.167							
	"	128.25	194.25	66.00	22.000							
	"	63.50	130.00	66.50	22.167							
	"	130.00	196.50	66.50	22.167	22.125	-17.65	+22.2	1.45	17.017	.661	16.356

							Gage #54	True			
6	3	75.00	158.75	83.75	27.917						
	"	116.75	200.00	83.25	27.750						
	"	56.00	139.25	83.25	27.750						
	"	139.25	222.50	83.25	27.750	27.792	32	30	28.381	1.043	27.338
7	3	45.25	143.00	97.75	32.583						
	"	104.00	201.50	97.50	32.500						
	"	52.50	150.50	98.00	32.667						
	"	51.00	149.00	98.00	32.667	32.604	42	39.6	38.181	1.436	36.745
8	3	37.00	144.75	107.75	35.917						
	"	119.00	226.25	107.25	35.750						
	"	50.00	157.25	107.25	35.750						
	"	76.00	183.25	107.25	35.750	35.792	50	48	46.381	1.731	44.650
9	3	68.25	188.50	120.25	40.083						
	"	83.25	203.50	120.25	40.083						
	"	79.25	199.50	120.25	40.083						
	"	72.25	192.50	120.25	40.083	40.083	62	60	58.381	2.170	56.211

CALIBRATION OF "INTERNATIONAL" HEAD, HUNG PENDANT

No. of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	5	59.50	99.00	39.50	7.900							
	5	99.00	138.75	39.75	7.950							
	6	138.75	186.00	47.25	7.875							
	6	186.00	233.75	47.75	7.950	7.921	-2.6	+3.25	.8	.876	.085	.791
2	4	59.75	110.50	50.75	12.688							
	"	110.50	162.00	51.50	12.875							
	"	162.00	213.50	51.50	12.875							
	"	170.50	223.25	51.75	12.938							
	"	161.25	212.75	51.50	12.875	12.850	-4.65	+5.85	.8	3.081	.358	2.723
3	3	56.75	111.00	54.25	18.083							
	"	111.00	166.00	55.00	18.333							
	"	166.00	221.50	55.50	18.500							
	"	171.75	226.50	54.75	18.250							
	"	167.50	222.25	54.75	18.250							
	"	139.00	194.00	55.00	18.333	18.292	-8.05	+10.05	.8	6.653	.452	6.231
4	3	78.50	127.50	57.00	19.000							
	"	127.50	184.50	57.00	19.000							
	"	184.50	240.75	56.25	18.750							
	"	156.00	213.00	57.00	19.000	18.938	-12.55	+15.65	.8	11.470	.486	10.984
5	3	65.50	130.50	65.00	21.667							
	"	130.50	196.50	65.00	21.667							
	"	106.50	172.00	64.50	21.833							
	"	172.00	236.50	64.50	21.500	21.667	-15.9	+19.9	.8	13.073	.634	14.439

							Gage #54	True			
6	3	51.00	139.25	88.25	29.417						
	"	139.25	227.25	88.25	29.417						
	"	58.00	146.75	88.75	29.583						
	"	146.75	235.00	88.25	29.417	29.459	32.3	30.3	28.681	1.167	27.514
7	3	42.75	148.00	105.25	35.083						
	"	148.00	252.00	104.00	34.667						
	"	35.00	140.00	105.00	35.000						
	"	140.00	244.75	104.75	34.917	34.917	42	39.8	36.181	1.647	36.534
8	2.5	87.50	187.00	99.50	39.800						
	3	54.50	174.50	120.00	40.000						
	"	120.75	240.50	119.75	39.917						
	"	114.00	233.75	119.75	39.917	39.909	56.7	54.7	53.081	2.151	50.930
9	3	31.00	170.50	139.50	46.500						
	"	100.00	239.50	139.50	46.500						
	"	99.50	239.50	140.00	46.667						
	"	97.50	237.25	139.75	46.583	46.563	75.7	73.5	71.801	2.929	68.952

CALIBRATION OF "ESTY" HEAD HUNG UPRIGHT

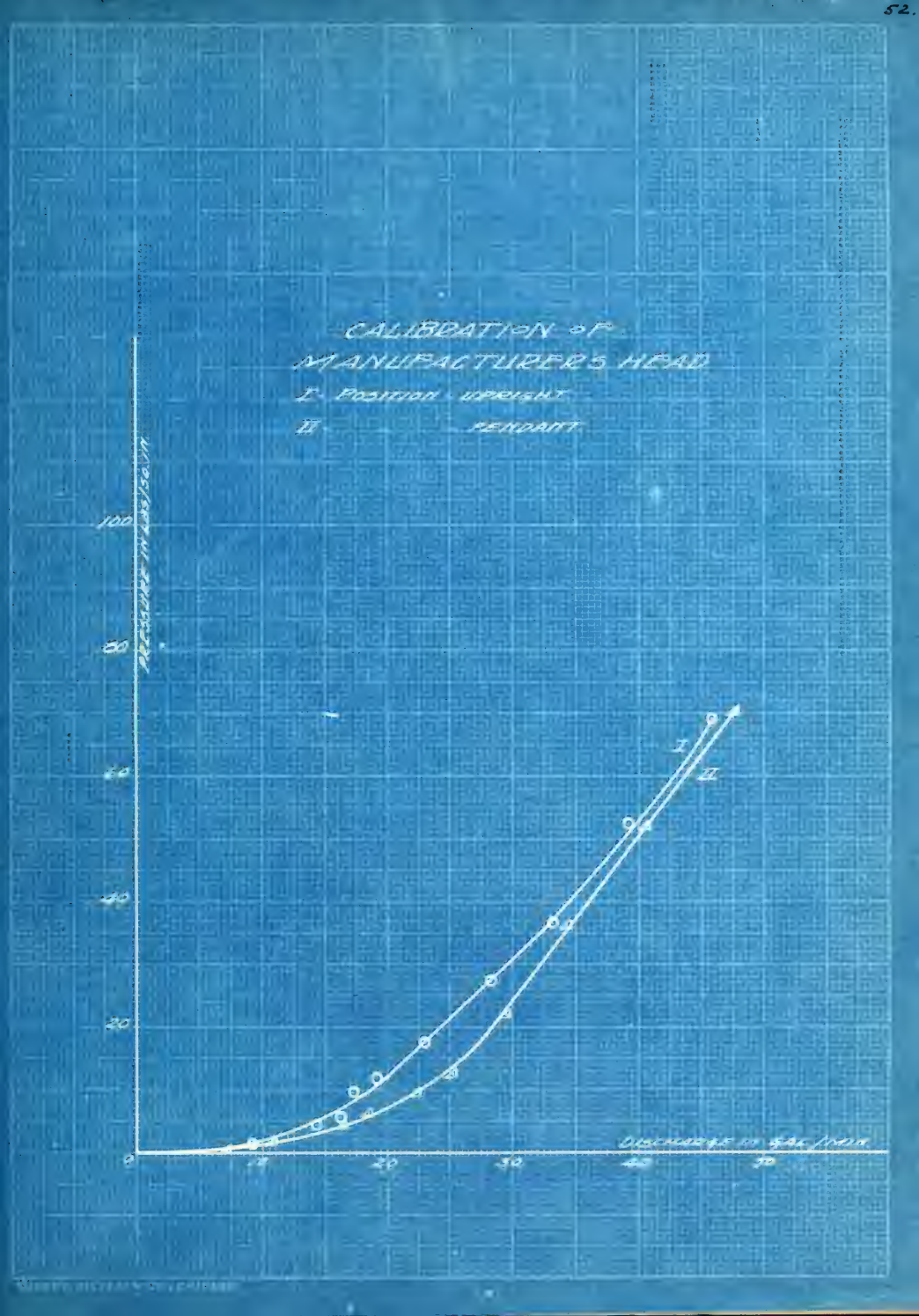
No. of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	6	84.00	125.00	41.00	6.833							
	"	125.00	165.50	40.50	6.750							
	"	165.50	206.00	40.50	6.750							
	"	179.75	220.00	40.25	6.708	6.760	-2.40	+2.90	1.00	.621	.062	.559
2	4	95.50	144.50	49.00	12.250							
	"	144.50	193.50	49.00	12.250							
	"	193.50	242.25	48.75	12.188							
	"	117.50	166.25	48.75	12.188	12.219	-4.55	+5.66	1.00	2.920	.202	2.718
3	3	56.50	139.00	82.50	27.500							
	"	139.00	191.50	82.50	27.500							
	"	191.50	244.00	82.50	27.500							
	"	180.00	232.50	82.50	27.500	27.500	-.790	+9.86	1.00	6.499	.415	6.084
4	3	45.50	117.25	71.75	23.917							
	"	117.25	188.50	71.25	23.750							
	"	88.75	160.50	71.75	23.917							
	"	160.50	232.00	71.50	23.833	23.854	-1.25	+16.5	1.00	12.211	.769	11.442
5	3	47.00	130.25	83.25	27.750							
	"	47.00	130.75	83.25	27.750							
	"	130.25	213.50	83.25	27.750							
	"	50.50	133.75	83.25	27.750							
	"	133.75	216.50	82.75	27.583	27.708	-1.74	+21.8	1.00	16.692	1.044	15.648

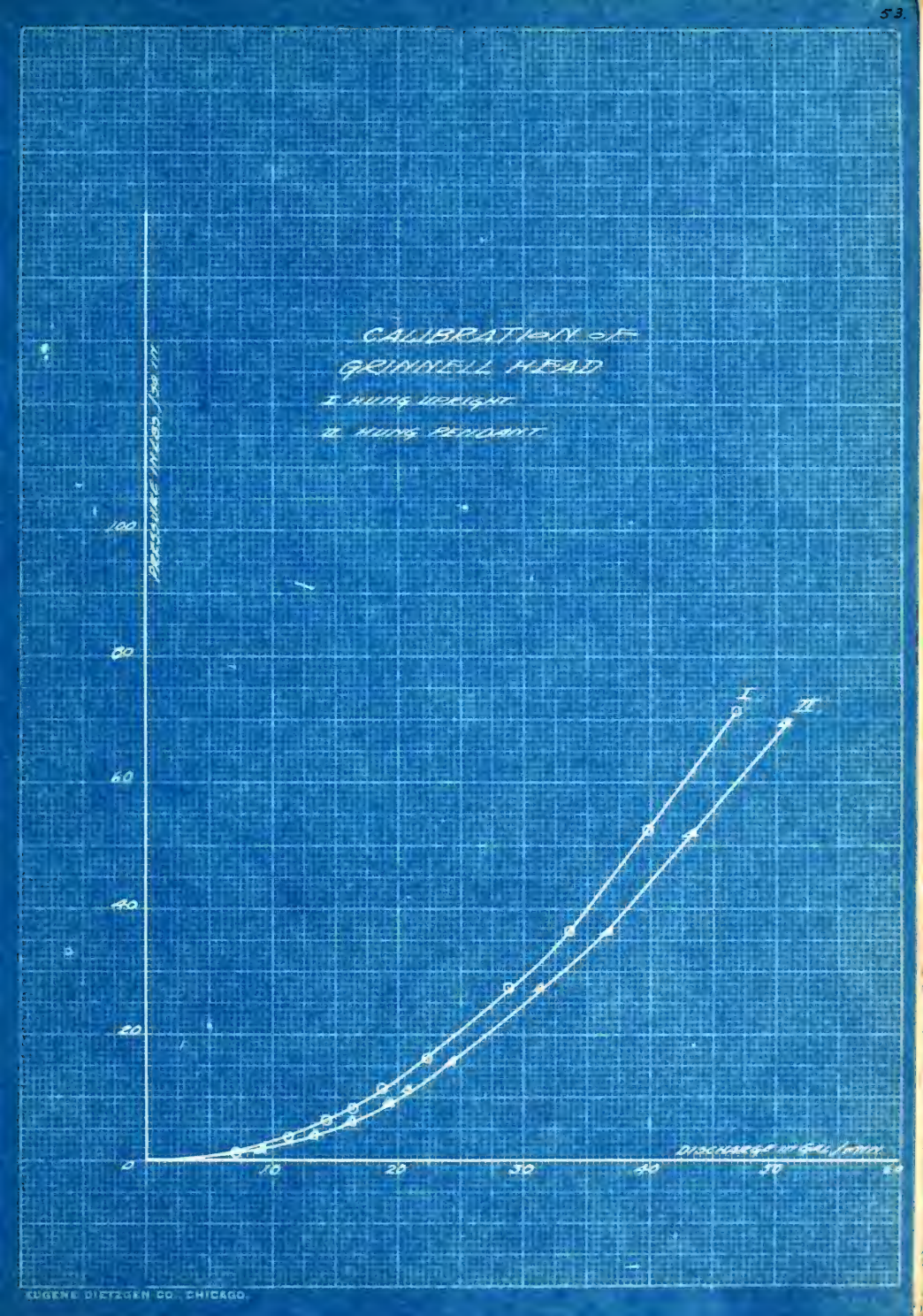
							Gage	Corr.	True			
6	3	85.75	179.00	93.25	31.083							
	"	103.00	196.25	93.25	31.083							
	"	127.00	220.00	93.00	31.000							
	"	142.50	235.50	93.00	31.000	31.042	32		30	20.381	1.302	27.079
7	3	35.50	144.75	109.25	36.417							
	"	94.25	203.00	108.75	36.250							
	"	71.50	180.00	108.50	36.167							
	"	83.25	192.25	109.00	36.333	36.292	42		39.6	36.181	1.776	36.405

CALIBRATION OF ESTY HEAD HUNG PENDANT

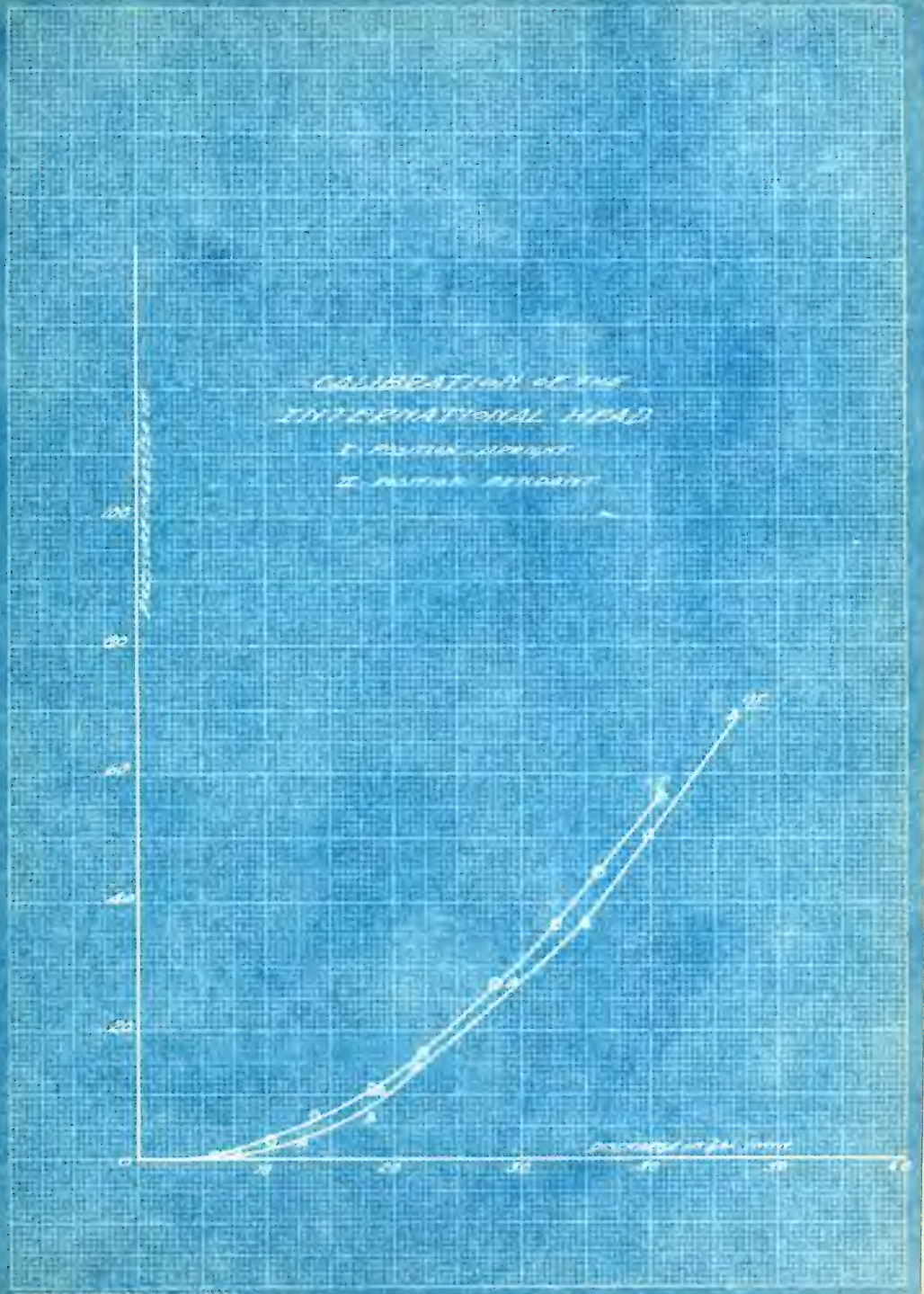
No. of Run	Duration of Run	Gallons Tare	Gallons Full	Gallons Net	Discharge in Gallons per Minute	Average Discharge in Gallons per Minute	Gage Reading A	Gage Reading B	Gage Reading C	Pressure Corrected for Water Column	Velocity Pressure Correction	Corrected Pressure
1	5	40.50	87.00	46.50	9.300							
	"	87.00	134.25	47.25	9.450							
	"	134.25	180.50	46.25	9.250							
	"	180.50	227.50	47.00	9.400							
	"	131.50	178.00	46.50	9.300	9.340	-2.9	+3.55	.55	1.151	.116	1.033
2	3	111.00	153.50	42.50	14.167							
	"	153.50	195.50	42.00	14.000							
	"	195.50	238.00	42.50	14.167							
	"	86.00	128.50	42.50	14.167	14.125	-5.00	+6.20	.55	3.402	.270	3.132
3	3	128.50	181.00	52.50	17.500							
	"	85.50	138.00	52.50	17.500							
	"	138.00	190.00	52.00	17.333							
	"	172.00	224.00	52.00	17.333	17.417	-7.10	+8.85	.55	5.654	.410	5.244
4	3	102.50	170.00	67.50	22.500							
	"	170.00	237.25	67.25	22.417							
	"	94.00	161.25	67.25	22.417							
	"	161.25	228.50	67.25	22.417							
	"	83.75	151.00	67.25	22.417	22.434	-10.80	+13.50	.55	9.612	.680	8.932
5	3	95.00	172.00	77.00	25.667							
	"	126.00	203.00	77.00	25.667							
	"	95.00	172.00	77.00	25.667							
	"	118.50	195.50	77.00	25.667							
	"	41.00	118.25	77.25	25.750							
	"	118.25	195.25	77.00	25.667	25.681	-13.90	+17.35	.55	12.907	.887	12.020
6	3	95.00	173.00	80.00	29.333							
	"	98.25	176.25	80.00	29.333							
	"	92.50	172.50	80.00	29.333							
	"	113.25	201.00	87.75	29.250	29.312	-17.00	+22.05	.55	16.389	1.161	15.726

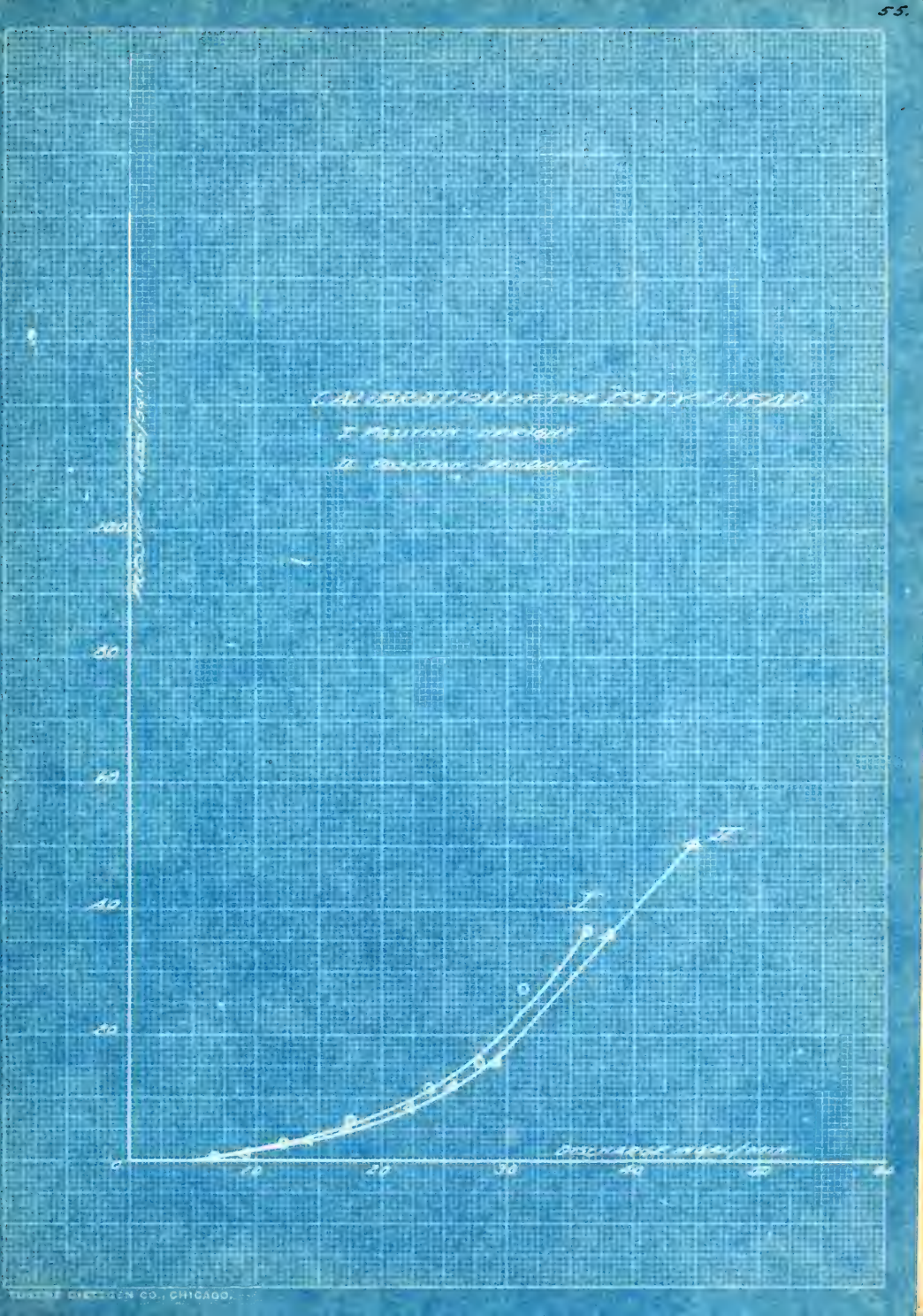
							Gage	True			
7	3	80.50	194.25	113.75	37.917						
	"	85.75	199.50	113.75	37.917						
	"	90.75	204.75	114.00	38.000						
	"	93.20	207.25	114.25	38.083	37.979	42#	39.8#	38.181	2.159	36.022
8	3	54.75	219.50	134.75	44.917						
	"	77.75	212.25	134.50	44.833						
	"	78.50	212.75	134.25	44.750						
	"	89.00	223.00	134.00	44.667	44.792	56.7	54.7	53.081	3.710	50.371


CALIBRATION OF
MANUFACTURER'S HEAD
I. POSITION UPRIGHT
II PENDANT
PRESSURE IN LBS. PER SQ. IN.
100
80
60
40
20
0
I
II
10
20
30
40
50
DISCHARGE IN GAL./MIN.

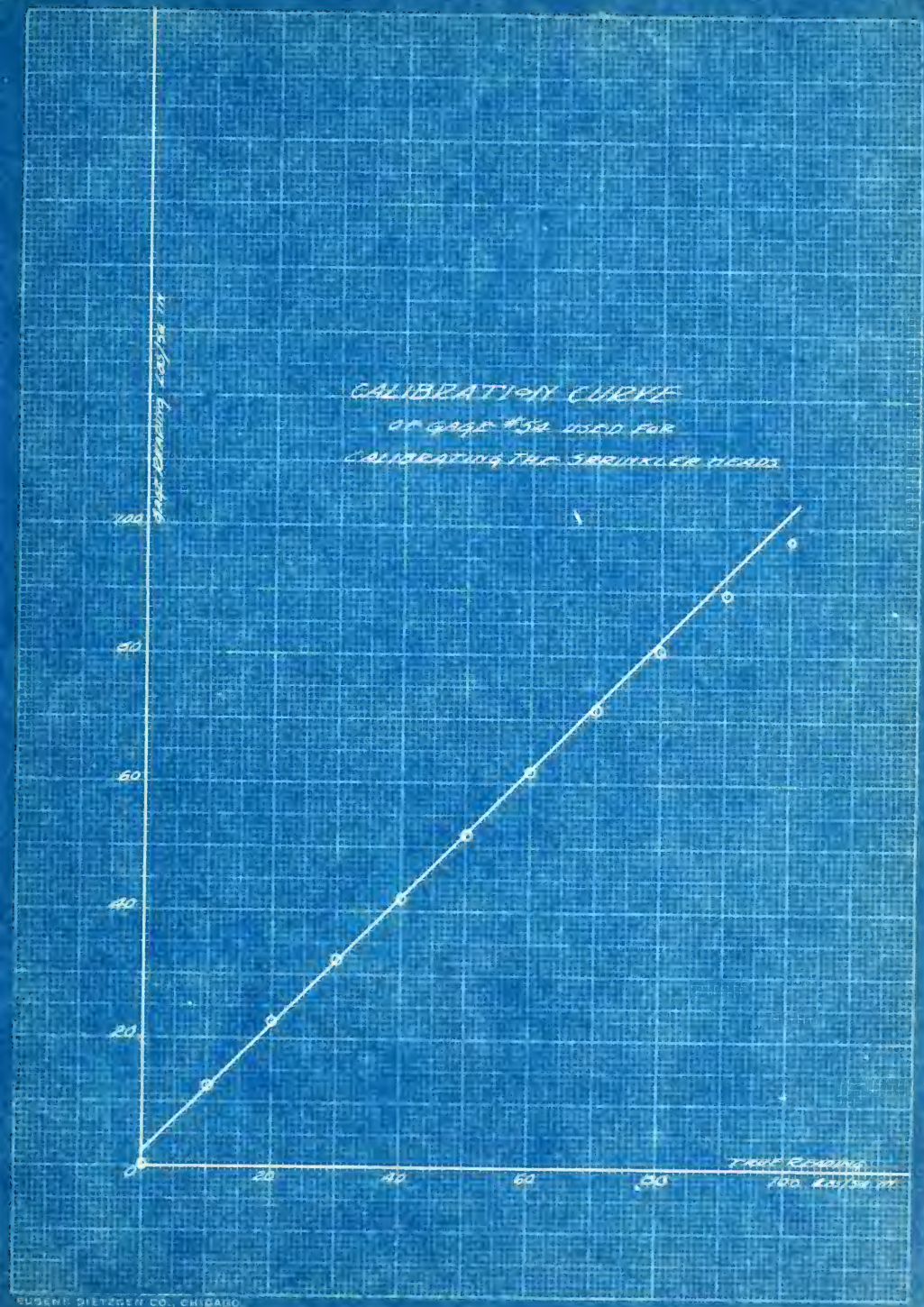


EUGENE DIETZGEN CO., CHICAGO.


CALIBRATION OF THE
ELECTROMAGNETIC FIELD
E. MILLIKAN, AUTHORITY
R. MILLIKAN, AUTHORITY



KEUFFEL & ESSER CO., CHICAGO.



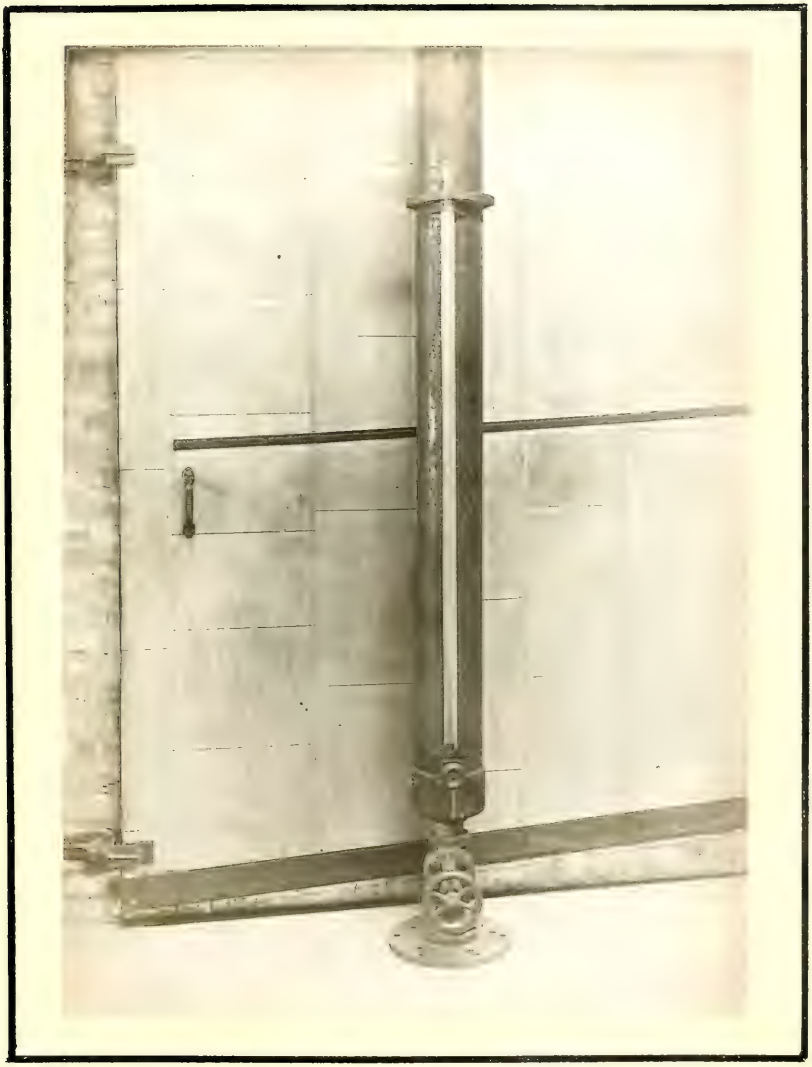
EUGENE DIETZGEN CO., CHICAGO

MANUFACTURERS, NO
UPRIGHT

GRINNELL

ESTY, C.
1896

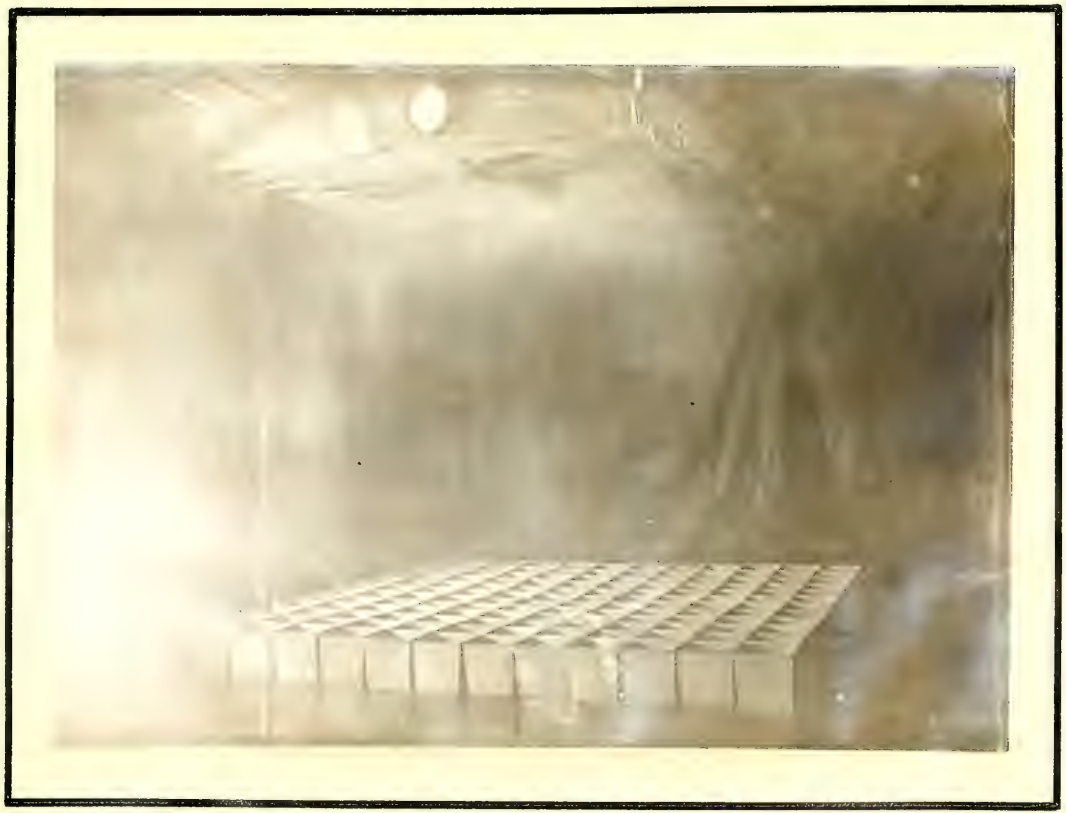
ARRANGEMENT OF APPARATUS FOR CALIBRATION.



MEASURING TANK.

SHOWING THE TWO FRAMES IN POSITION BEFORE THE RUN.

GRINNELL, PENDANT.
LOW PRESSURE DISCHARGE.



GRINNELL, PENDANT, PLANE CEILING.
45# PRESSURE.

GRINNELL, PENDANT, PLANE CEILING.
65 # PRESSURE.